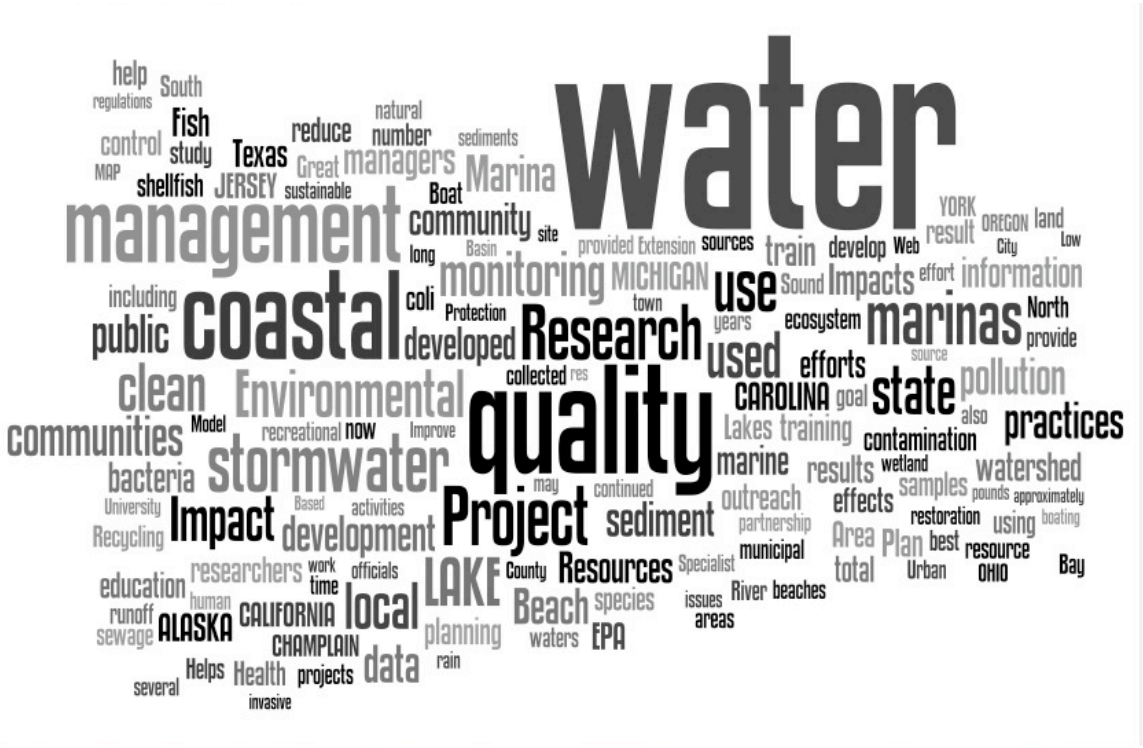
HEALTHY COASTAL ECOSYSTEMS FOCUS TEAM

WATER QUALITY IMPACTS

OCTOBER 2009



118 ALASKA: Alaska Sea Grant helped protect coastal water quality

Activity Summary: In 2000, MAP began a partnership with the Alaska Native American Fish and Wildlife Society (ANAFWS), with funding from the Environmental Protection Agency (EPA), to conduct a water quality training program in rural Alaska. The goal of the program was to develop water quality monitoring projects that meet the strict scientific rigor of the EPA Quality Assurance Project Plan (QAPP) protocols. MAP developed the curriculum, taught 60 percent of the course content, served as a technical advisor on several QAPPs. ANAFWS funding of this training program ended in 2007. However, MAP began collaboration with the University of Alaska Anchorage's Environmental and Nature Resources Institute, and developed a recertification class. EPA has authorized this recertification program, which is now taught to technicians needing recertification. To date, three recertification workshops have been held, one each in Anchorage, Bethel, and Dillingham. Impact Statement: People participating in this training developed 18 EPA-approved Quality Assurance Project Plans for their region, and were thus able to receive funding to employ a local tribal environmental coordinator. Twenty-seven technicians have been recertified by MAP. These efforts established a first line of defense to detect future water quality issues. Participants are now actively engaged in questioning activities that may potentially affect water quality in their communities and regions, and are actively educating others in their communities about water quality issues. The data collected by these monitors provide a baseline for detecting and tracking future water quality changes that may result from human and natural change. *[(wq train)]*

947 ALASKA: Alaska Sea Grant increased awareness of paralytic shellfish poison and harmful algal blooms

Activity Summary: A decades long PSP awareness and education outreach effort has been successful in limiting PSP illnesses among Alaskans and visitors. During this reporting period, MAP held five workshops, two training sessions, and a presentation at the Alaska Health Summit. Impact Statement: During 2007, there was one reported PSP illness. This is the lowest level of illness recorded since formal testing began in 1973. Residents of Kodiak Island, where subsistence shellfish gathering has been culturally important, have largely avoided shellfish in large measure because of the education and outreach efforts conducted there. Activity Summary: MAP was a co-PI on a North Pacific Research Board funded project titled, Response and Intervention System for Climate Change Induced Paralytic Shellfish Poisoning (PSP) in Aleut Communities, PSP Monitoring and Outreach. During the two years of the project, nine community technicians were trained in the standard operational procedure for sampling, storing, testing, and shipping of shellfish samples. About 150 samples were tested from nine species of shellfish. Outreach included reports delivered to over 500 persons in 19 communities and progress posted on five Web sites. Impact Statement: This project extended the range of known PSP occurrence in shellfish ranging from King Cove, Alaska, to the Commander Islands, Russia. PSP values are now available for subsistence harvest shellfish species not previously tested. Communities received and were receptive to the information provided. A sustained monitoring program was established in King Cove. This monitoring program is significant because residence of this small community of 150 residents regularly ship their harvest to communities as far away as Seattle, and to an estimated 1,000 Native American shellfish consumers. In 2007, after detecting PSP in Bering Sea blue mussels and surf clams, King Cove voluntarily suspended shellfish shipments. *[(hab dis wq fish train cli)]*

415 CALIFORNIA: Sea Grant Helps Boaters Save Money & Improve Water Quality

Boat owners use copper paints to control hull fouling that slows, sailboats and increases powerboat fuel consumption, but copper leached from these paints harms marine life. New regulations require 2,000 San Diego Bay boat owners to cut 76 percent of copper discharges by 2022. Boat owners and businesses need effective alternatives to maintain California's $16 billion per year boating business, while protecting water quality. Sea Grant found that nontoxic coatings cost more than copper paint to apply and keep clean, but the cost is offset by the nontoxic coatings' longer service life. Nontoxic coatings remained on several boats after 4.5 years and the owners were satisfied. In contrast, copper paints must be replaced after 2-3 years in San Diego (yearly in some parts of the U.S.). Long-lasting, nontoxic epoxy and ceramic-epoxy coatings will enable San Diego Bay boat owners to avoid cost increases from complying with new regulations, and reduce discharges of toxic, heavy metals into this sensitive ecosystem. Coastal boat owners in other areas can help improve water quality without incurring extra costs by using nontoxic coatings. *[(wq)]*

1161 CALIFORNIA: Grunion as Indicator of Beach Health

R/CZ-195, A CASG scientist is using the spawning populations of California grunion as an indicator of beach health. Trained citizen volunteers (Grunion Greeters) count spawning grunion on beaches. Impacts: Information from this project has led to new beach grooming practices in many parts of California. This Sea Grant-funded method for assessing grunion populations is now used by two private consulting firms and Orange County. In addition, the Grunion Greeters Project was one of only a few programs nationwide to participate in the 2006 Wildlife Watch Weekend sponsored by the National Wildlife Federation. *[R/CZ-195 (train wq)]*

1174 CALIFORNIA: Marine pathogens and toxins

This project contributes to our understanding of the ecology of opportunistic marine pathogen and marine toxins in the coastal water. This understanding contributes to human health protection from recreational activity and marine policy on coastal water management. *[R/CON-127PD (dis wq)]*

1184 CALIFORNIA: New Surf-Zone Model Predicts Waves and Currents

R/CZ-188 and R/CZ-196, Feddersen, CASG scientists have created a model that estimates surf-zone waves and currents that will use real-time data collected by the Southern California Coastal Ocean Observing System (SCCOOS) to generate site-specific forecasts. This will help managers predict how long beaches must be closed to public use following contamination events. Coastal managers will begin using the model mentioned above that will predict the fate of nearshore contaminants to estimate the length of beach closures due to contamination. *[R/CZ-196 (mon mod wq)]*

4 CONNECTICUT: Connecticut Sea Grant helps determine the toxicity of PCBs in different species

PCBs are ubiquitous environmental contaminants. While their effects have been relatively well documented in laboratory animals, their effects in humans are assumed to be somewhat similar, with a few accidental exposures (to PCBs and other contaminating chemicals) resulting in compatible health effects. While the mechanisms and pathways involved in the effects of dioxin and dioxin-like PCBs are relatively well understood, the effects of the non dioxin-like PCBs (which are the most abundant in the environment) are relatively undocumented and have until very recently been for the most part ignored. CTSG worked at understanding the effects of those under-studied PCBs, and at comparing the immunotoxicity of PCBs between species. Our efforts also assessed the value of the current methods to quantify the health risks associated with exposure to PCBs. Impact: '¢ Research at CTSG allowed for the accurate quantification of the congener-specific toxicity of dioxin-like and non dioxin-like PCBs in humans, mice and marine mammals. In addition, this research demonstrated for the first time the applicability of those results in species-specific risk assessments, facilitating the ability to model and predict the risk of exposure to PCBs. *[M/PA-1 (wq wq wq dis)]*

5 DELAWARE: Sea Grant establishes a historical record of contamination in the Delaware River estuary

¢ Sea Grant establishes a historical record of contamination in the Delaware River estuary: Using chemical data and radioisotope chronologies from tidal marsh sediment cores, Sea Grant researchers have determined the burial record of organic and inorganic pollutants introduced to the estuary since the late 1940s. Results indicate a significant decrease in nutrient loading and contaminant levels starting in the early 1970s, consistent with the establishment of federal source reduction programs. Impact: Their methods have been adopted by the Delaware River Basin Commission to develop total maximum daily loads for PCBs in the estuary. *[R.ETE-11 (wq wq mod)]*

1258 FLORIDA: Rapid water quality test

The quantitative test developed for the rapid detection of Enterococci bacteria in water samples can be used as a warning system to aid resource managers. *[R/C-E-52 (wq mon)]*

6 GEORGIA: Sea Grant research helps determine safe fish consumption guidelines

Dr. Aaron Fisk's study (GA Sea Grant project # R/WQ -20) has provided the only data set for concentrations of PFC's in Georgia surface waters. Scientists at Georgia DNR are using this data to create predictive models that will help them determine safe fish consumption guidelines. *[R/WQ-20 (wq wq wq fish)]*

485 ILLINOIS/INDIANA: Sea Grant funds development of a database that helps ensure safe drinking water

In drinking water, some disinfectant by-products, or DBPs, which result from the reaction of organic matter with disinfectants, can have long-term health impacts, including several types of cancer. Some

DBPs have been linked to fetal development problems. Michael Plewa, a University of Illinois genetic toxicologist, has developed a comprehensive database of toxicity levels of DBPs considered a priority by the U.S. EPA. This database will provide important data to aid in the EPAâ€™s assessment of present regulations. The database can also serve as a much-needed practical resource for the water treatment community as they make decisions regarding local disinfection practices. *[R/WF-09-06 (wq)]*

486 ILLINOIS/INDIANA: IISG informs Areas of Concern communities as they go through the clean-up process

The Great Lakes Legacy Act (GLLA) provides matching funds to communities to speed up the pace of cleanup of contaminated sediments within Great Lakes Areas of Concern. Since the inception in 2002, five remediation projects and one monitoring project have been completed. Fourteen projects are underway. In 2008, three more remediation projects were signed. At each site, IISG specialists work with the local community through public meetings, newsletters, site visits and informational posters placed at public facilities to help the community stay up to date on the activities at the cleanup sites. The communities also rely on IISG to help them navigate between federal and state agencies. In 2008, the GLLA was reauthorized for two more years and includes new provisions for communities to develop habitat restoration projects at sites where remediation is occurring and provides full funding for evaluating project sites for future remediation. IISG has provided outreach support to two communities that are developing habitat restoration plans after remediation. This effort will expand in the future under the new GLLA. *[A/SE-01-08 (wq wq res)]*

1298 ILLINOIS/INDIANA: IISG informs regional water supply planning

As part of the Chicago Metropolitan Agency for Planning's Regional Water Supply Planning Group, IISG is contributing to the development of a water supply plan to ensure more sustainable use of water supply resources that serve the approximately 8.7 million people within the greater Chicago metropolitan region. IISG examined the efficacy of water supply planning and found that the benefits of regional water supply planning (in terms of avoided infrastructure costs) generally exceed the costs by a factor of two, thus strongly justifying the funding of such plans. Thus far, a critical step in the plan has been achieved—defining the region's future supply and demand. Next, IISG will contribute research results that inform the region's water supply plan in terms of conservation pricing to promote sustainable water use. *[M/P-01-06 (wq)]*

8 LAKE CHAMPLAIN: Sea Grant provides supports rain garden installation by citizens, municipalities and businesses in Vermont.

Focus Area: HEALTHY COASTAL ECOSYSTEMS NOAA SG Goal - Sound scientific information to support ecosystem-based approaches to managing the coastal environment LCSG Goal - Provide science-based information that will promote a healthy and diverse ecosystem and provide for sustainable human use and enjoyment of Lake Champlain, the basin and surrounding waters. Objective - Local residents and communities (including youth) act to protect and restore coastal, aquatic and watershed resources in the basin as a result of increased awareness of threats from NPS pollution (including phosphorus, toxins

and bacteria), invasive species, and other water-related human health hazards. Sea Grant provides supports rain garden installation by citizens, municipalities and businesses in Vermont. Working with a large number of partners, LCSG assisted homeowners, municipalities, schools and businesses with the siting, design and installation of rain gardens through a number of projects, including Vermont's Rooftop to Rivers Rain Garden Contest, St Albans LID Demonstrations, and Mid-Winooski River Watershed Urban Restoration Project. The LCSG Water Quality Specialist assisted in the installation of over 40 rain gardens by over thirty homeowners, on six properties in four municipalities, at three businesses, and at four condo associations. In addition, the St Albans Roadside Rain Garden project, with the Northwest Regional Planning Commission, the City of St Albans, Vermont Youth Conservation Corp and Bishop Street Residents, led to the installation of six curb-side rain gardens by the city that eliminated local stormwater flooding problems as well as reduced storm water volume discharging to impaired surface waters. *[A/M-1 (ebm train wq wq)]*

14 LAKE CHAMPLAIN: Sea Grant finds that commonly used lamprey control treatment has significant and unexpected environmental impacts

Researchers concluded that 3-trifluoromethyl-4-nitrophenol (TFM) lampricide, used in the Lake Champlain basin for lamprey control, had significant impacts on aquatic stream macroinvertebrates. Significant changes included decreases in density in 16 of 83 benthic taxa, and changes in drifting behavior on the dates following TFM treatment. Post-treatment changes in taxa density affected the community composition of both benthic and drifting populations. A full recovery of affected organisms was not evident by the final sampling date, 33 days after TFM application. Impact: The non-target effects were not identified in the environmental assessment of the lamprey control project. Because effects of the chemical (TFM) management approach on non-target species are now more clearly evident, stakeholders are reassessing the use of non-chemical techniques to reduce sea lamprey populations with fewer impacts on the benthos. *[A/M-1 (inv wq wq ebm)]*

494 LAKE CHAMPLAIN: Local officials successfully rehabilitate impaired waters with Lake Champlain Sea Grant education and outreach assistance

Statement: All surface streams in Chittenden County, VT, are impaired and the focus of a large scale rehabilitation effort by state and municipal government, often in collaboration with watershed resident organizations. waterways –helping local residents to organize, then educate and assist them to be effective Sea Grant support, through local level awareness and education activities, youth and volunteer water quality monitoring, and training local government officials in pollution prevention and stormwater management technology. Impacts: Significantly lowered bacterial contamination levels: Bacterial levels in impaired streams have dropped significantly. A permanently closed beach at the mouth of Burlington's Englesby Brook is now fully open for swimming. At Thayer's Beach in Colchester, VT, the number of days of beach closure have declined significantly. Significant reductions in runoff volume: Rain gardens installed by local officials in the former mill town of Winooski, VT, significantly reduced the volume of stormwater reaching impaired Morehouse Brook. *[(res wq)]*

545 LAKE CHAMPLAIN: Sea Grant rain garden education and demonstration projects improve water quality in VT urban areas

Statement: LCSG's Winooski Rain Garden Project trained city staff and led the city to adopt rain gardens and rain barrels on municipal property throughout the small (1 mi^2) , heavily urban former mill town. Impact: Measurements made at stormwater outlets after various levels of rainfall showed a significant reduction in stormwater volume discharging to Morehouse Brook, a stormwater impaired stream. Reductions in volume discharged ranged from over 70% in ½ inch rainfall to nearly 30 % in a 3 inch rainfall. *[(wq train)]*

1313 LAKE CHAMPLAIN: Sea grant helps municipal officials and engineers in northern New England use Low Impact Development planning, site design and stormwater management practices.

Focus Area: HEALTHY COASTAL ECOSYSTEMS NOAA SG Goal – Sound scientific information to support ecosystem-based approaches to managing the coastal environment LCSG Goal – Provide science-based information that will promote a healthy and diverse ecosystem and provide for sustainable human use and enjoyment of Lake Champlain, the basin and surrounding waters. Objective - Local residents and communities (including youth) act to protect and restore coastal, aquatic and watershed resources in the basin as a result of increased awareness of threats from NPS pollution (including phosphorus, toxins and bacteria), invasive species, and other water-related human health hazards Sea grant helps municipal officials and engineers in northern New England use Low Impact Development planning, site design and stormwater management practices. LCSG, in partnership with University of Maine Cooperative Extension, Maine NEMO, University of New Hampshire Cooperative Extension and USA EPA, presented four Weathering the Storm: Managing Stormwater with Low Impact Development (LID) in Northern New England conferences in the region. Over 100 municipal officials attended individual conferences. Post conference evaluation showed that participants' knowledge about specific actions to take to improve stormwater management increased by 64%, and participants' knowledge of LID options, performance, application, costs, and benefits increased by 65%. As a result of the knowledge gained conference, IBM in Burlington, VT installed a large rain garden to treat storm water from a 1-acre parking lot. The town of Woodstock VT modified its zoning regulations to specifically include a LID ordinance. *[A/M-1 (wq train)]*

560 MICHIGAN: Sea Grant Publications Promote Stewardship of the Great Lakes

Michigan Sea Grant distributed a total of 116,000 web and print publications to targeted users in 2008, including 12,000 copies of the upwellings newsletter, 3,500 pdf publications and 16,500 additional print publications from its bookstore. 84,000 visits were made to specific pages on Michigan Sea Grant's website. The website continues to grow as new sections are added about coastal habitats, climate change, medical waste disposal, and integrated assessment. Popular web pages about invasive species, fisheries, and Sea Grant's K-12 resources continue to draw visitors. *[(cli wq edu)]*

124 MINNESOTA: Sea Grant Redefines How E. coli Bacteria is Used in Water Quality Monitoring

Sea Grant scientists discovered that E. coli, which is used to justify beach closures and impaired stream designations, doesn't always come from potentially harmful sources. E. coli can be carried by benthic fish and can reside in sand, sediment, soils, and algae. The discovery nullifies assumptions that E. coli is washed into the water from the land or comes from sewage overflows. Sea Grant researchers also developed new protocols (rep-PCR DNA fingerprinting) for rapidly testing for bacteria and identified sources for most E. coli bacteria in samples from northeastern Minnesota. Samples from gulls, terns, deer, and beaver contributed to a total of 234 new isolates in the region's E. coli fingerprint library. Humans contributed between 0 and 9 percent of the total E. coli that could be identified in each sample. By contrast, E. coli from waterfowl and wildlife accounted for 56-97 percent. Results are being used by the Minnesota Pollution Control Agency (MPCA) to refine testing methods and health risk assessments. Citizens tested bacteria monitoring kits and found that the Petrifilm test kit works best for E. coli monitoring. Volunteers collected nearly 600 bacteria samples from 86 different sites on 40 streams and 14 lakes in 23 Minnesota counties. The sites they monitored were established in the EPA STORET database and data from the 4-year project was submitted to the Minnesota Pollution Control Agency for use in lake and stream assessments. Data are often used by local governments or citizen groups for targeting additional monitoring, identifying areas for best management practices, or securing and allocating funds to conduct further monitoring. Several streams were listed as impaired on the MPCA impaired waters list as a result of volunteers' monitoring. *[(wq wq)]*

571 MINNESOTA: Sea Grant Helps Coastal Communities Balance Development and Environmental Concerns

Sea Grant helped to review permit requests for city and tax forfeit land parcels for suitability for development in relation to environmental concerns and create the Lakewood Township Comprehensive Plan. Five communities within the Lake Superior Watershed relied on Sea Grant community planning advice to guide ordinances and planning with respect to water quality and natural resource protection. Using Sea Grant materials and expertise, Minnesota's Woodland Advisers are offering hands-on sediment and erosion control workshops for forest land owners. Cook County officials were able to publicize, coordinate, and facilitate public meetings for the Poplar River Total Maximum Daily Load (TMDL) study, and offer data about the Poplar River (an impaired river) online in an accessible way. These actions collectively help the policy makers, planners, and the public to understand how they affect community planning, stormwater management, and Lake Superiorâ€™s water quality. *[A/CC-2 (wq train)]*

1373 MINNESOTA: Sea Grant Research Aids Lake Superior Beach Monitoring Program

Sea Grant scientists have found that the potentially harmful bacteria species Escherichia coli (E. coli) that is used by beach monitoring programs to justify beach closures doesn't always come from harmful sources. They found the E. coli can be carried by benthic fish and can live as natural residents in the beach environment – in the sand, sediment, soils, and algae. Often, it's assumed that E. coli found during beach monitoring is washed into the water from the land or comes from sewage overflows. University of Minnesota researchers have shown that's not always the case. Their results are being used by the Lake Superior Beach Monitoring Program to refine testing methods and health risk assessments. *[R/CCE-2-05 (mon wq)]*

476 NEW JERSEY: Sea Grant Launches Marina Industry Enhancement Program (2008)

(2008) Fueled by funding from the New Jersey Department of Transportationâ€™s I BOAT NJ program, New Jersey Sea Grant has awarded special grants to marinas throughout the state to help them implement projects and practices that will reduce potential environmental impacts associated with recreational boating. The grants will be used to cover the marinaâ€™s expenses for products that reduce or prevent environmental impacts, promote environmental enhancements and for other expenses or projects that directly help the marinas meet or maintain the requirements of the stateâ€™s New Jersey Clean Marina Program. Approximately $200,000 was awarded to twenty marinas. *[A/SGEP-1 - A/S-1 (wq)]*

23 NEW YORK: Sea Grant researchers discover the geochemical factors that are key to the future management of Long Island Sound, one of the nation's most economically and environmentally significant estuaries

R/CMC-7 Monitoring of Bottom Water and Sediment Conditions at Critical Stations in Western Long Island Sound. Research results show that hypoxic conditions in western Long Island Sound (WLIS) are actually controlled by different processes at different times of the year. For the first time, a sediment geochemical control on bottom water chemical conditions has actually been documented in the Sound. This represents an important control on bottom water chemistry that is not accounted for in present water quality models of LIS. IMPACT: The results of this research point to the necessity to carefully monitor yearly inputs of organic matter to the sediments of WLIS, in conjunction with surface and sediment temperatures, and benthic community development, in order to formulate a management plan that may allow for the existence of some commercial fishery in WLIS. More importantly, these factors and their products (sulphide and ammonia released from sediments, bottom water and water column hypoxia and anoxia, sediment-oxygen demand, stratification) need to be monitored and results used to form the basis of a management plan for WLIS in an effort to prevent WLIS from becoming a dead zone akin to that which exists in the Gulf of Mexico at the present time. *[(wq mod wq)]*

123 NEW YORK: New Approaches for Assessing Mutagenic Risk of Contaminants in the Long Island Sound Environment

R/CTP-30 Sea Grant researchers have adapted a cutting-edge biomedical technique to test for the mutagenic potential of coastal sediments. The benthic sediments in urban habitats represent a reservoir of persistent contaminants that may pose a threat to both ecosystem and human health. To help evaluate these risks, testing approaches are needed that assess both acute mortality and potential chronic effects that may reduce the fitness of affected populations. Using a strain of fish embryos carrying a specific gene developed for biomedical research (the Japanese medaka, Oryzias latipes, carrying a lambda cII transgene), researchers tested for the mutagenicity of a large number of sediment samples collected around metro New York and Long Island Sound (LIS). This was a novel use of a biomedical research tool to directly evaluate the mutagenicity of mixtures of contaminants in sediment samples. Results of the project provided baseline information on cytotoxicity and mutagenicity of a relatively large number sediment samples collected around LIS. This approach allows whole sediments to be assessed directly without chemical modification. Through direct contact with the sediment, the

embryo accumulates only the bioavailable fraction of contaminants associated with the sediments. Thus, this method allows both environmentally and physiologically realistic exposure scenarios. Based on this work, the lead researcher was awarded a major grant from the National Fish and Wildlife Foundation (NFWF) to study the combined effects of endocrine mimics and hypoxia on aquatic organisms using fish embryos to meet the objectives of the Dissolve Oxygen Benefit Fund. The aim of the NFWF project is to use molecular tools to develop a relatively rapid and inexpensive assay to discern the separate and combined effects of hypoxia and endocrine mimics in urban estuarine systems. New methods and rapid assays will lead to better management practices to mitigate effects of sewage loadings. *[(wq wq wq)]*

477 NEW YORK: Sea Grant Promotes Cost-Effective Municipal Stormwater Management

Municipal stormwater management and nonpoint source pollution control are vital to protecting Long Islandâ€™s estuaries. Addressing polluted runoff, pathogen-contaminated beaches, and wetland degradation are among the issues for which New York Sea Grant (NYSG) Nonpoint Education for Municipal Officials (NEMO) Program provides technical expertise to nearly 100 Long Island municipalities. Using its list-serve, consultations, presentations, and written feedback, NYSG NEMO helps municipalities comply with EPA Phase II Stormwater regulations. Through NYSG NEMO outreach, some communities have improved construction requirements and procedures for site plan review; changed an ordinance for retention of rainwater from new driveways; improved erosion and sediment controls for small projects; strengthened drainage requirements, initiated storm drain retrofit projects and encouraged low-impact development. NY NEMO feedback has prompted development of sustainable funding mechanisms, a septic system inspection program, and equipment procurement. In todayâ€™s challenging economic times, NYSG NEMOâ€™s most enduring impact is its facilitation of cost-effective inter-municipal stormwater management. Since 2001, the number of cross jurisdictional efforts has grown from Nassau County in the west into Suffolk Countyâ€™s East End. *[A/EEP-33 (wq)]*

478 NEW YORK: New York Sea Grant: Helping marinas help themselves (and save money)

New Yorkâ€™s recreational boating industry generates billions of dollars in revenue. NYâ€™s marinas, struggling to contain costs, must also comply with regulations such as the 2007 revised permit program, Storm Water Discharges Associated with Industrial Activities. NYSG and partner, NY Marine Trades Association (NYMTA), held a workshop for marina operators, many of whom did not know about regulatory changes or the required Storm Water Pollution Prevention Plan (SWPPP). NYSG developed materials on the permit program used at training courses and created a readily useable template for a model marina SWPPP, and posted it to NYSGâ€™s Marina Pollution Prevention Web site (where downloaded 970 times). NYMTA reported 57 percent of its 61 members used the template to develop their own SWPPPs and saved consultants fees ($3,500 to $5,000), thus saving a total between $108,500 and $155,000. If the same percentage of marinas in the total population of 450 marinas in downstate NY used this material, savings would be between $0.9 million and $1.3 million for the recreational boating industry. *[A/EEP-33 (train wq)]*

587 NEW YORK: Sea Grant promotes cost-effective municipal stormwater management

Polluted stormwater, including bacteria, sediment, debris, nutrients, toxic substances and other contaminants, poses serious economic and human health concerns in Long Island Sound, the Peconic Estuary and the South Shore Estuary Reserve. As operators of storm sewer systems, municipalities are responsible for implementing stormwater management programs as required by the Clean Water Actâ€™s Phase II regulations. NYSGâ€™s Nonpoint Education for Municipal Officials Program (NYSG NEMO) has helped meet these challenges on Long Island by promoting cost-effective intermunicipal Phase II efforts that advance watershed-based resource protection priorities. IMPACT: In 2007, NYSG NEMO launched the Phase II-L.I.listserve, to improve its timely response to requests for support and to disseminate important guidance materials, funding announcements, and stormwater management updates from the National NEMO Network. Now at more than 100 members, Phase II-L.I. offers the municipal Phase II community an interactive forum through which stormwater managers initiate working relationships and exchange information, expertise, and experience. *[A/EEP-33 (wq)]*

1405 NEW YORK: New York Sea Grant's new informative CD on land use planning helps communities concerned with water quality

New York Sea Grant provided funding to Cornell University's Department of City and Regional Planning to help NYSG and Cornell Cooperative Extension develop an educational tool for local decision makers that give them the background they need to protect water quality while meeting other community goals of commercial and residential development. The final product is an educational CD that showcases four hypothetical communities based on four real New York communities; each case study projects growth using population data for the area and the resulting degradation of water quality under existing zoning. Alternative zoning and planning techniques are proposed for the four communities to permit the same amount of growth, while protecting water quality. The CD Land Use Planning: An Informative CD for Communities Concerned with Water Quality has been widely distributed throughout NY State (through Cornell Cooperative Extension) and is now being used by municipal officials, zoning boards and planners interested in smart growth. *[A/EEP-21 (edu wq)]*

1413 NEW YORK: Sea Grant researchers discover feminization of fish due to endocrine disrupting compounds in NY waters

Sea Grant researchers found evidence that endocrine disrupting compounds in Jamaica Bay, an urban estuary in the New York metro area, have caused some level of feminization of winter flounder, an economically significant. Impact: This work has been leveraged into $1.2 million in funding from other sources as well as a new mass spectrometer facility. At least one municipality is examining treatment technologies to remove estrogen from sewage effluents. Awareness of endocrine mimics in local waters has been disseminated to the NY metro public via articles in Newsday and a segment on NBC-TV Channel 4 evening news, local edition. *[R/CTP-28 (wq)]*

126 NORTH CAROLINA:

A Sea Grant sediment-sampling protocol for fecal indicator bacteria has identified areas of contamination in local waters used by the public. The sediment sampling approach improves upon conventional water sampling because the indicators last longer in sediments than the water-column signals are available. The researchers provided results to the N.C. Environmental Management Commission, which reviewed the strong influence of stormwater runoff on sediment contamination by fecal indicator bacteria. The research results -- reflected in new, stronger storm water regulations – generated strong reaction and media coverage, thus increasing public awareness of the problems. (NCSG: Effects of Sediment Phosphorus Concentration on Fecal Pathogen Indicators in Estuarine Sediments; R/MER-50) *[(wq wq wq)]*

479 NORTH CAROLINA: NC Local Officials Respond to Educational Programs

As a result of Sea Grant educational programs for coastal community officials on water quality, habitat degradation and other natural resource impacts associated with development, one county is critically evaluating existing zoning plan and other ordinances using a GIS-mapping and modeling exercise to predict water quality impacts of full build out. In addition, several counties have adopted low-impact development practices. *[A/EA-10 (wq edu mon mod)]*

1421 NORTH CAROLINA: Agencies Use Ammonium Data

Results on both the estuarine behavior and atmospheric sources of the important nitrogen species, ammonium/ammonia, amino acids, and dissolved organic nitrogen provide critical information for state and local agencies and organizations responsible for managing or assessing water quality of the Cape Fear. Such agencies include the U.S. Army Corps of Engineers, the Lower Cape Fear River Program, and the N.C. Divisions of Water Quality and Air Quality. From the standpoint of management, the Sea Grant project results will be applicable to the establishment of water quality criteria that consider all sources (benthic fluxes, riverine, atmospheric) of nitrogen, not just one source. *[R/MER-44 (wq)]*

1425 NORTH CAROLINA: DYNAMICS OF NUTRIENTS, PHYTOPLANKTON AND CHLOROPHYLL A

Project results indicate that both the amounts and composition of new nitrogen entering the Neuse R. Estuary-Pamlico Sound continuum are important drivers of phytoplankton community composition and activity. In a nutrient management context, this means that human activities impacting both the amount and quality of N sources must be carefully monitored and managed. Sea Grant research results are having major impacts on the formulation (calibration), evaluation and verification of the EPA- and State of North Carolina (Dept. of Envirnment and Natural Resources-DENR)-mandated Total Maximum Daily (N) Load (TMDL) for the Neuse River Estuary. The role of organic N has also been shown to be important in eutrophication of these and other N-limited estuarine ecosystems. Lastly, the means of N delivery (i.e. chronic vs. acute) proved to be very important in phytoplankton productivity and compositional responses. Since tropical storm and hurricane activities are predicted to increase over the next 10-40 years, careful consideration must given to how episodic runoff and flooding events will impact production, nutrient cycling and food web dynamics of these ecosystems. *[R/MER-47 (hab wq)]*

1455 NORTH CAROLINA: Research results used by managers

Sea Grant research results were used by N.C. Shellfish Sanitation to help justify a long-term closure of Hewletts Creek in New Hanover County following major sewage spills there in July 2005 and again in September 2005. Similar warnings have been relayed to the public with regard to another major sewage spill in the Cape Fear River in July 2006. *[R/MER-50 (wq)]*

1466 NORTH CAROLINA: Sea Grant techniques transferred to varied research

Mass spec methods identified by Sea Grant researchers provide a means to assess success of various manangement strategies designed to enchance natural N removal. This approach is now integrated into a Virginia oyster restoration study to assess the validity of oyster restoration for nutrient credits. These mass spec and molecular techniques are being applied to studies of soil systems that include Nitrogen fertilizer. Finally the rapid screening tools developed by Sea Grant researchers can be applied to wider spatial and temporal assessment of Nitrogen removal hotspots in estuaries. (NCSG: Microbial Nitrogen Cycling in the Cape Fear River Estuary: Attenuation vs. Recycling and the Effects of a Variable Freshwater-Saltwater Boundary, R/MER-54) *[R/MER-54 (res wq mon)]*

1470 NORTH CAROLINA: Trophic Transfer Research Cited in CHHP

Results from Sea Grant research were cited frequently in the description of water-column habitats in the Coastal Habitat Protection Plan (http://www.ncfisheries.net/habitat/chpp1.htm) by identifying threats to pelagic organisms from symptoms of declining water quality such as hypoxia._Broken Rungs At the Bottom of the Ladder: Effects of Estuarine Stratification on Trophic Transfer Between Plankton and Grazers; Lead PI: Peter Rand, NC State University, chris_taylor@ncsu.edu, R/MRD-47 *[R/MRD-47 (wq ebm)]*

500 OHIO: Sea Grant helps Lake Erie marinas recycle and save money

Statement: Working with an Ohio plastics company located in the Appalachian region of Ohio, Ohio Sea Grant helped coordinate the 3rd year of a boat shrink wrap and greenhouse plastic recycling effort as a “value added” project for the Ohio Clean Marina Program. Impact: Shrink wrap is now being collected from over 120 coastal marinas resulting in the recycling of over 720,000 pounds of shrink wrap and172,000 pounds of greenhouse plastic into useful products, saving individual marinas an average of $700 per year in disposal costs, and saving hundreds of cubic yards of valuable landfill space. *[(wq ebm)]*

117 OREGON: Contamination Source Identified by Sea Grant Efforts

Spurred by high beach closures due to contamination, Oregon Sea Grant's Curry County Extension Agent Frank Burris, teamed with state and federal researchers and coast citizens to document the timing and extent of bacterial contamination. His vigilant and frequent sampling reduced the number of beach

closure days by 43%. And, more importantly the more than 300 water samples taken over the past three years along five creeks and the ocean identifies the source is terrestrial, not marine. Not only is the bacteria coming from upstream, the 24-hour tests showed that the level of harmful bacteria increased at night. A newly discovered finding as DEQ always takes water samples during the day. Sleuthing the upstream source (sources) is underway Speculation at this point leans towards a combination of septic tank system failures and high water runoff (with domestic animal feces) from city neighborhoods. The many hours spent in early 2007 in waist high surf taking middle-of-the-night water samples is paying off. http://www.currypilot.com/ne/results.cfm?story_no=14484
http://oregonprogress.oregonstate.edu/mediaindex.php#slideshow scroll down to 'Tracking Beach Contamination.' Then click on 'slide show' to view. *[A/ESG-7 (wq wq wq)]*

496 OREGON: Protecting and Conserving Oregon Groundwater Supplies through “Citizen Science”

The Oregon Water Resources Department (OWRD) in the Natural Resources Office has a vested interest in protecting and conserving Oregon groundwater supplies. The OWRD, in collaboration with Oregon Sea Grant, supported the establishment of a fellow who would develop a groundwater-level monitoring program, including the development of all training, promotional, and outreach materials; the program’s Web site; and the evaluation of this pilot program. Abigail Brown, an Oregon State University (OSU) master’s student in water resources policy and management, led this collaborative pilot project in the Eola Hills groundwater limited area, under the precept of engaging citizens in research and collection of scientific data (“citizen science”). Twenty-six people were trained to measure the water levels in their wells at Neighborhood Groundwater Network (NGWN) workshops. Eleven of the resulting water-level measurements were entered into the OWRD online database. In this leading example of citizen science, the training materials and program design developed through this Oregon Sea Grant fellowship are already being adopted in both Benton County and the Yamhill County Soil and Water Conservation District. It is clear there is widespread interest in understanding, protecting, and measuring groundwater supplies across Oregon. An impromptu review of community groundwater-level monitoring programs across the United States indicates that such programs are rare. These types of projects could be implemented by a variety of organizations, including watershed councils, soil and water conservation districts, counties, and schools. *[(mon train wq)]*

603 OREGON: Stormwater Management Ordinances Improved

Oregon’s south coast agent, Frank Burris, spent a substantial amount of time providing City of Brookings managers with “critical information on low impact development and stormwater management as the city moved to incorporate regulations to help with storm drainage,” said City Planning Director Dianne Morris. Burris's presentations to Brookings' Planning Commission and city governments aired publicly for citizen input on the local cable access channels. Morris said that “several citizens who viewed this expressed interest in learning more about the techniques and supported the Code changes.” The input and information Burris provided on the many iterations of proposed ordinance content and language were vital in the final rendition. As a result of Burris's assistance, Brookings' Planning Commission passed stormwater management ordinances in April, 2009, and the City Council passed them on June 8, 2009. *[(wq)]*

1482 PENNSYLVANIA: Delisting Sediment Impairments in Lake Erie

Collaborated with DEP on the development and implementation of a sediment study of Presque Isle Bay, Area of Concern in Recovery. The results of the study indicated that the quality of sediment was safe enough to lift restrictions on dredging. As a result of the study, the dredging beneficial-use impairment was officially delisted in summer 2007 allowing deepening of the channel. *[A/ (wq)]*

1483 PENNSYLVANIA: Developing Standardized Criteria for the Assessment of Fish Deformities in Great Lakes Areas of Concern.

The criteria were established through the facilitation of three workshops funded by EPA. The standardized criteria were developed with the assistance of national experts in fish pathology and environmental assessment who were recruited by PASG. The manual and criteria were presented at the International Association of Great Lakes Research and will be adopted by the International Joint Commission and US EPA as standard methodology for use in Great Lakes Areas of Concern. *[A/ (wq)]*

482 PUERTO RICO: Capacity building in coastal issues: Watershed Management

Watershed management: Land- Sea Alliance: introduction to Jobos Bay Estuary. A new initiative between JBNERR, UPR Sea Grant College Program (UPRSGCP), and the UPR Agricultural Extension Service (AES) to provide AES specialists and extension agents with tools and new information available on best management practices implemented in the reserve watershed. In the overall 100% of the participants increased their knowledge and scientific understanding in watershed management. They also were aware of collaborate and establish partnerships with UPR Sea Grant and JBNERR. A comment of this activity was: â€œThis has been something wonderful. It has given me knowledge, educational material, and an interest that I donâ€™t have before to take that knowledge to communities on my municipality. Thanks for an excellent collaboration and information transfer.â€ *[M-151-3-06 (wq train)]*

579 PUERTO RICO: Capacity building in coastal issues: Stormwater management

Stormwater management: NPDES Small Municipal Separate Storm Sewer System (MS4) General Permit Workshop in collaboration with the Puerto Rico Stormwater Office of EPA. These training activities provided to municipalities of Puerto Rico the requirements and process to develop a Storm Water Management Plan for small municipalities (Small MS4 General Permit). Up today 24 municipalities and nine campuses of the University Puerto Rico, including its Central Administration Offices submitted the MS4 General Permit with the Storm Water Management Plan. A total of 102 municipal officials, and coastal decision makers received formal training in MS4 General Permit completing a total of 627 training hours. *[M-151-3-06 (wq train)]*

580 PUERTO RICO: Coastal Management Public Policy Initiative

Sea Grant supported the establishment of a NGO alliance to work in a land use protection strategy in order to protect the coastal water quality of the south west region of Puerto Rico. Five non governmental organizations work very closely with Sea Grant promoting the best land and water use practices in the area. Ciudadanos AguadeÃ±os Pro ConservaciÃ³n del Ambiente, Aguada (CAPCA) CAPCA and Sea Grant are working together for the last five (5) years. Coastal inland marina project, electromagnetic pollution and sewage discharges are the principal environmental concerns for CAPCA and Sea Grant provided technical and scientific support for their needs. Also, Sea Grant prepared an article related to water pollution and water quality data obtained by CAPCA volunteers during a two years cycle. The organization was capacitated to participate and prepare effectively for their public participation in the governmental processes. Nowadays, CAPCA prepared and submitted formal statements and comments to the state agencies related to their concerns and are a recognized as an important ngo group in the west region of Puerto Rico. Consejo Vecinal de la UrbanizaciÃ³n San JosÃ© (CVSJ), MayagÃ¼ez The CVSJ, a residential project developed in a coastal flood area, recently declared Tsunami Warning Zone, work together with Sea Grant towards a sustainable development along the Mayaguez Coastal Zone. During 2007, the Consejo, supported by Sea Grant, effectively participate in a public hearing where a new development project was intended to be constructed. More than fifty (50) new family homes were protected and saved from the risk of live in a Tsunami flood zone. La Tea en Pie de Lucha (LTPL), San GermÃ¡n LTPL is an old NGO established at Barrio La Tea in San GermÃ¡n. During the last four years, Sea Grant are involved with the community promoting Clean Water Act Compliance in an 80 acres mining activity in San GermÃ¡n. Sea Grant efforts achieve that EPA issued two administrative compliance orders to the industrial facility and people of La Tea protected two perennial streams that were impacted by the extraction activities. At this time, the mining operations were in compliance with the federal regulations. Juristas Hostosianos Pro Ambiente, Mayaguez Sea Grant, in alliance with Juristas Hostosianos Pro Ambiente (JHPA) and the AsociaciÃ³n Nacional de Derecho Ambiental (ANDA) organized the Segunda Jornada Ambiental: Acceso a la Justicia: a toda COSTA 2007. More than one hundred (100) participants attended the workshop. A complete coastal legal CD was delivered to each participant and a formal environmental law clinic was established in the Mayaguez Law School to assist low income community groups. Workshop presentations were published in the Law School web page (www.hostos.edu). DiÃ¡logo Ambiental and ComitÃ© Pro Rescate de Aguirre, Salinas DiÃ¡logo Ambiental and ComitÃ© de Aguirre, in a partnership with Sea Grant, evaluated two different scientific reports about pollution impact of thermal discharges and a tire fire event in the coastal environment of BahÃ-a de Jobos. EPA clean procedure for sand and soil contaminated with tire burning pollutants and effect of warm waters in marine fauna were analyzed. After evaluation, a formal statement was prepared and submitted to the Environmental Quality Board and the Judicial Court. Finally, the community achieved a new clean procedure for the area and EPA is revising the NPDES permit for thermal discharges in Jobos Bay. *[M-151-1-06 (wq)]*

662 PUERTO RICO: Capacity building in coastal issues

In collaboration with the JBNERR Coastal Training Program, the UPR SCCD provided expertise and outreach advisory to coordinate nine capacity building activities to address coastal issues such as community development, land use planning, and stormwater management. The training activities were conducted to natural resources managers, biologists, social science specialists, planners, engineers and agronomists, soil scientists, and elected municipal officials. The area of stormwater management was coordinated with the EPA Caribbean Region Offices. Through these efforts 29 municipalities of Puerto

Rico submitted the Notice of Intention for the Small MS4 General Permit of EPA. In addition reserves managers from Reserves and Refuges of the PR Department of Natural and Environmental Resources are using the EPA Stormwater Pollution Prevention Plan for Construction Sites to evaluate impacts of construction sites in the managed areas. *[(wq)]*

2 SOUTH CAROLINA: Submarine groundwater discharge is patchy in Long Bay, SC, inner shelf.

Little information exists regarding solute exchange between land and sea in Long Bay, SC. In order to assess spatial distribution of submarine groundwater discharge (SGD) seeps, discharge rates, and dissolved chemical loads delivered to the nearshore ocean waters via SGD, a multiphase ongoing study has been undertaken by Coastal Carolina University in collaboration with South Carolina Sea Grant Consortium. Results from the preliminary electrical characterization study demonstrated that SGD seeps are likely patchy in distribution throughout the Long Bay inner shelf. SGD does not appear to be a uniform and diffuse process within the study area, but rather somewhat focused by geological controls. Comparison of continuous resistivity profiles (CRP) with seismic profiles indicates that discharge '˜hotspots' are spatially co-registered with seismic structures including but not limited to: paleochannels, discontinuous reflectors (karst features?), outcropping layers, and possibly even hardbottom location. The SGD research effort has resulted in at least seven presentations at regional and national meetings. Five of these presentations have students as lead authors and presenters. Coastal Carolina University undergraduate Dimitri Quafisi (B.S., Marine Science, 2007) presented his interpretations of seep distribution at the Big South Undergraduate Research Symposium where he won an award entitled Best Abstract. Dimitri then expanded his effort to propose a conceptual model of SGD mixing as a function of increasing distance from shore and presented a poster at the spring 2007 Geological Society of America Southeast Regional meeting. In the fall of 2007 at the American Geophysical Union annual meeting, PI Viso presented findings expanding on Quafisi's work to include discharge estimates. Following the 2008 sampling season, Viso presented new findings including nutrient concentrations at the AGU fall meeting. Coastal Carolina University graduate student Heather Gregory applied nutrient concentrations to discharge estimates and presented nutrient fluxes at the spring 2009 SE regional Geological Society of America meeting in Tampa, FL. She followed up with a talk at the 2009 Southeast Estuarine Research Society meeting. Presently, Viso, Gayes, McCoy and Quafisi have a manuscript in preparation for submission to Estuarine, Coastal and Shelf Science. This manuscript will focus on preliminary geological interpretations from the CRP snapshot from year 1 (2006). Lewis, Viso, McCoy and students have another paper planned to expand upon biogeochemical aspects of the study following the upcoming 2009 sampling season. McCoy and Viso have also planned a manuscript to focus on the discharge estimates calculated from 222-Rn excess. *[R/CP-15 (mon wq unk)]*

18 SOUTH CAROLINA: Understanding the Physical Mechanisms of Coastal Hypoxia Events

Episodes of depleted (<2mg/L) or low (<3 mg/L) oxygen levels in benthic waters can significantly impact biological communities in the coastal ocean and can cause significant negative economic impacts to recreational and commercial fisheries. During the summer of 2004 several episodes of low-oxygen concentration were observed in the nearshore waters off Myrtle Beach, South Carolina, alarming local residents and fisheries management. In response to the urgent need to identify the exact causes of such events and possibly limit their occurrence through appropriate coastal management actions a multidisciplinary study was carried out. Our contribution focused on identifying the physical conditions

that lead to hypoxia events in Long Bay, SC. We analyzed current, hydrographic and meteorological in-situ measurements for the years 2006 and 2007 and used a three-dimensional processes-oriented numerical model to understand these phenomena. The 2006 data set reveled that low-oxygen (< 3 mg/l) events on the coastal bottom layer are likely to occur during summer season (high solar radiation and low river discharge) and only when long periods (more than 15 days) of upwelling (i.e., from the south –southwest) favorable wind conditions. The water column remained stratified most of the time (a physical process that limits oxygen exchange with the atmosphere), due to solar radiation and to cold water intrusions from the middle-shelf bottom layer (i.e. Gulf Stream Water) via Ekman dynamics. In contrast, during summer of 2007 there were no low-oxygen events observed near the coast. During this period, the water column remained thermally homogeneous most of the time and there were no evidence of cold water intrusions. Wind data for that summer showed upwelling favorable conditions were present. According with the numerical results, the response of a highly stratified inner-shelf to constant upwelling favorable wind forcing, was the formation of a coastal front and associated jet that moves offshore with time. Inshore of the front, the water column becomee homogeneous, while offshore of the front Ekman transport takes place, carrying out cold water toward the coast at the bottom layer. The numerical experiments showed that the only physical conditions that can contribute to the cross-shore transport of colder and nutrient rich water to the nearshore is a combination of oscillatory upwelling wind conditions and thermal stratification by solar radiation. The cold water intrusions help to keep the water column stratified even under strong wind stress, condition that enhanced the Ekman transport and then vertical stratification and may lead to low oxygen events. The conditions described above are natural meteorological and oceanographic conditions that are a prerequisite for the development of hypoxic conditions, however, localized anthropogenic inputs in the nearshore might contribute into enhancing the severity of such events. Thus monitoring of the meteorological conditions can be the first step in assessing if there is a potential for the development of hypoxic condition in the summer. *[(wq mod wq wq)]*

107 SOUTH CAROLINA: In-situ acoustic instruments and fluorescence used to determine physical controls on benthic fluxes of microalgae.

Activities for this project began in August of 2008. This investigation is designed to use autonomous, in-situ acoustic instruments along with synchronized, simultaneous measurements of fluorescence to determine the possible physical controls on chlorophyll a (chl a) concentrations in Winyah Bay and North Inlet (SC). The planned data collection periods include seasonal deployments in both systems for comparison. Six minute averaged pressure data recorded during the installation shows a semi diurnal tidal oscillation characteristic of North Inlet and most East coast estuaries. North Inlet with no fresh water input is dominated by oceanic water and water levels are determined primarily by tides. The deployment occurred just prior to the peak in the spring tide and continued through the transition to neap. Harmonic analysis of the velocity components (u, along channel east, and v, cross channel north) derived from the ADVs shows the four major constituents in order to be; M2, K1, M4 and O1. Along channel velocity showed asymmetry toward ebb flow throughout the time of deployment. Maximum ebb flow velocities averaged approximately 42 cm s-1 and varied only slightly with the transition to spring tide. Flood tide velocities into the marsh showed a narrow range of 12 to 15 cm s-1. Asymmetry in channel velocities is an expected feature of the marsh being observed in previous investigations in North Inlet (Voulgaris and Meyers, 2004). Two, unequal daily peaks in chl a are evident over the displayed time series, though the overall magnitude of the peaks diminish with time probably due to biofouling. Peaks in chlorophyll appear to occur at low water only and close to slack water. The larger

peaks in chl a concentration occur concurrently with Total PAR peaks (Total PAR data for the deployment period were downloaded from the Baruch Marine lab website, Oyster Landing NERR platform, http://links.baruch.sc.edu/weather.htm), however, the smaller peak occurs in the absence of light. The maximum in chl a concentrations, though influenced by light, appears to correlate more closely with low water and maximum in ebb flow channel velocity. The next goal will be a longer deployment of the observation tripod in the tidal creek covering an entire spring-neap transition. Special attention needsa to be placed in preventing signal deterioation due to biofouling. *[R/CP-16 (mon wq)]*

581 SOUTH CAROLINA: SC Sea Grant extension activities promote community understanding of coastal issues and how they can be managed.

Assistance with Comprehensive Land-Use Planning: As part of CGI, a small grants program, the S.C. Coastal Community Initiative Grant Program (SCCCI) was established to provide an incentive to engage local governments in the development and implementation of â€œquality growthâ€ land management policies and practices. Two important objectives of this grant program are for participating coastal communities to make a commitment to working with the SCSGEP to understand â€œquality growthâ€ principles and to seriously consider incorporating one or more of these principles into local land use plans and policies. On a yearly basis, proposals have been solicited from coastal municipalities and counties to participate and to date, six coastal communities have received SCCCI grants ranging from $2500 to $5000 to address a variety of issues related to related to open space preservation, natural resource-based planning, water quality management, alternative transportation, sustainable community planning and design, and zoning ordinances and regulations. Since the inception of the SCCCI more than $60,000 has been leveraged by the communities participating in the grants initiative Maintain Existing and Establish New Linkages and Collaborative Partnerships: The S.C. Coastal Information Network (SCCIN) emerged as a result of a number of coastal outreach institutions and constituencies working in partnership to enhance coordination of the coastal community outreach efforts in South Carolina. This organized effort, led by the S.C. Sea Grant Extension Program and coordinated by the Coastal Communities Specialist, includes partners from federal and state agencies, regional government agencies and private organizations seeking to coordinate and/or jointly deliver outreach programs that target coastal community issues. The purpose of this collaboration is to avoid duplication of efforts and minimize the number of meetings/workshops that community leaders and staff are asked to attend, leverage scarce resources, maximize program benefits and expected outcomes. To facilitate communication and coordination, Network partners have created a member list serve and developed a web site (www.sccoastalinfo.org) with a searchable database calendar of all participating partnersâ€™ outreach events in coastal South Carolina SCNEMO and Other Related Water Resources Management Programs: The CC specialist is the outreach project coordinator for the Biennial Sea Grant Program project, â€œAn Assessment of Stormwater Best Management Practices for Coastal South Carolina: The Oak Terrace Preserve Monitoring Projectâ€. The project purpose is to evaluate the efficiency and efficacy of innovative stormwater management practices and these evaluations will be used to improve the understanding of hydraulic changes through construction phasing (which is significant to developing regional stormwater management techniques). The outreach team members are tasked with promoting public awareness and understanding of watershed concepts and the link between development and water quality through outreach education programs and products. As coordinator of the outreach component of the project, the CC specialist has been involved in the development of NPS fact sheets, focus group workshops, and bioswale demonstration workshops. The SCNEMO Team continued the process of revising the SCNEMO Program, with particular attention being paid to enhancing the

programâ€™s principles and strategies with local scientific research (science infusion). The CC specialist with the help of the Assistant Director of Research and Planning organized and convened a meeting with local scientists to discuss how to infuse/incorporate their research results and information into the SCNEMO program. Coastal Access/Waterfront Diversity Investigative Study: In collaboration with the S.C. Sea Grant Extension Program Fisheries Extension specialist and a contracted marine resource economist (Ray Rhodes), the CC specialist contributed to a study investigating water access challenges and opportunities for water dependent marine fishing stakeholders - both commercial and recreational. Conducted an in-depth study investigating the current state of waterfront access for commercial and recreational fishing stakeholders in coastal South Carolina. The study included an extensive literature search and compilation, as well as one-on-one interviews with diverse stakeholders including commercial and recreational fishermen, state-level fishery managers and coastal resource managers, county-level planning staff, commercial fishing dock owners and recreational fishing pier operators. The goals of the study were to determine the current state of waterfront access in coastal S.C. and any surrounding waterfront access issues, to provide examples of local waterfront access initiatives occurring in the state, and to identify existing and new tools for addressing waterfront access issues in the state. The study was completed in 2008 and the report is available for download from the S.C. Sea Grant Web site. â€œThe Waterfront Access Reportâ€ - outlined current trends in waterfront access for commercial and recreational fishing/boating sectors, as well as coastal development trends. Based on stakeholder interviews, summaries of current S.C. initiatives and the tools used to implement maintenance or preservation of waterfront access for fishing purposes were compiled. Also as part of the report, a comprehensive resource list of other waterfront access initiatives across the nation was compiled and a glossary of acquisition-based and non-acquisition based tools used by communities was developed. South Carolina Nature-Based Tourism Association (SCNBTA): The CC specialist continued to interact with the SCNBTA members, attending annual board meetings, as well as SCNBTA annual conferences, and seminars during the reporting period. The CC specialist continued to serve on the SCNBTA Board of Directors (since 2007), as well as the conference/workshop planning committee. The CC specialist is responsible for coordinating the newly redesigned Web site, which includes generating and distributing monthly and quarterly Web site statistical analysis reports and monitoring the site for broken links and necessary updates. Linking Land-Use Planning with Hazards Planning: The CC specialist continued to participate on two of the Charleston County Project Impact Committees throughout the project period. The S.C. Coastal Information Network (SCCIN) is in the preliminary stages of organizing three information sessions for coastal decision-makers in the upcoming months to discuss the potential impacts of shoreline change in South Carolina, including beachfront and estuarine shorelines. Experts on shoreline change will present the current status of climate, sea level, and shoreline change in South Carolina and initiate a public discussion and exchanging of ideas at the local level. Following the informative presentations and facilitated breakout group sessions, participants will identify the next steps to help prepare communities for the impacts of shoreline change. *[A/CG-1 (cli wq mon)]*

491 SOUTHERN CALIFORNIA: Sea Grant's work on hydromodification helped to secure $1million dollars to develop tools for managers to assess impacts of and provide recommendations for hydromodification in new and redevelopment.

The white paper entitled "Managing Runoff to Protect Natural Streams: The Latest Developments on Investigation and Management of Hydromodification in California" was coauthored by Susan Zaleski, Sea Grant's Coastal Resources Specialist, and Dr. Eric Stein of the Southern California Coastal Water Research Project (SCCWRP). As a direct result of this work Sea Grant partner Southern California Coastal

Waters Research Project (SCCWRP) was awarded $1 million from the State Water Resources Control Board and the California Stormwater Monitoring Coalition. *[(wq)]*

596 SOUTHERN CALIFORNIA: The California Ocean Protection Council identifies Low Impact Development as a priority for planning and using lands in coastal watersheds.

Sea Grant's involvement in the CA WALUP partnership led directly to adoption by the state body of the principles and techniques developed by Sea Grant and its partners for minimizing and mitigating the impacts of development. Three million dollars has been allocated for demonstration projects in California. *[(wq)]*

1557 SOUTHERN CALIFORNIA: New research methods allow managers to quantify pollutant loading in urban waterways

Sea Grant researchers have been able to successfully measure model contaminants (PAH and organochlorides) in the urban estuaries and waterways, making it possible for managers to quantify low-levels of toxins affordably, accurately and in a more timely manner than traditional techniques allow. *[R/CE-19 (wq)]*

1559 SOUTHERN CALIFORNIA: Sea Grant research aids in prediction of dispersion of contaminated discharge from land based sources.

Models of transport and dispersion of stormwater and treated sewage from municipal sources and sewage treatment plants allow coastal resource managers to predict the spatial and temporal flows of potentially contaminated discharges into the coastal zone. *[R/ CE-20 (wq mod)]*

487 WISCONSIN: Public health officials in Wisconsin attended Wisconsin Sea Grant's management meeting on Cladophora

Public health departments around the Great Lakes also have become interested in the impact of Cladophora on public health. We had representatives from Door, Kewaunee, Milwaukee, Ozaukee, Kenosha, Racine, Manitowoc and Sheboygan counties at our UW Sea Grant 'Cladophora and Lake Michigan: Community options for management' meeting (08-09). All have appreciated the confluence of information presented at these meetings and the desire to learn more about the causes of and mitigation possibilities for Cladophora on their beaches. *[R/UC-1 (wq)]*

533 WISCONSIN: Sea Grant researcher works with Milwaukee County to implement stormwater best management practices

Our research documented that stormwater significantly affected beach water quality, As a result, Milwaukee County invested more than 1 million dollars in redesigning stormwater outfalls and a large

surface parking lot to redirect stormwater to rain gardens and infiltration beds. These stormwater best management practices are a pilot study for future beaches. Once completed, this project has the potential to create jobs (lifeguards, beach vendors, maintenance workers, etc.), bring tourism money to the Milwaukee area, and improve the overall health of the community. *[R/UC-2 (wq)]*

1651 WISCONSIN: Sea Grant Leads Fox River TMDL Public Involvement and Outreach

At the request of U.S. EPA, Wisconsin Sea Grant's water quality specialist organized and chairs a TMDL Public Involvement and Outreach Committee to develop a public education and participation strategy for the Lower Fox River TMDL. The group has identified and interviewed targeted audiences, developed key messages and outreach materials, organized stakeholder sessions and a public meeting, conducted a Social Indicators Survey of all dairy producers in the basin, reviewed draft plans and made numerous public presentations and media interviews. In addition, the specialist organized two TMDL sessions for regional conferences (Fox-Wolf Watershed Stormwater Conference held in March 2007 and the State of Lake Michigan Conference in October 2007). The group's efforts have been lauded by EPA as one of the best examples of TMDL outreach in the nation. If successful, the TMDL will substantially reduce phosphorus and suspended solids loads from the Fox River, the largest tributary source of TP and TSS to Lake Michigan. *[A/AS-1 (edu wq)]*

118 ALASKA: Alaska Sea Grant helped protect coastal water quality

Activity Summary: In 2000, MAP began a partnership with the Alaska Native American Fish and Wildlife Society (ANAFWS), with funding from the Environmental Protection Agency (EPA), to conduct a water quality training program in rural Alaska. The goal of the program was to develop water quality monitoring projects that meet the strict scientific rigor of the EPA Quality Assurance Project Plan (QAPP) protocols. MAP developed the curriculum, taught 60 percent of the course content, served as a technical advisor on several QAPPs. ANAFWS funding of this training program ended in 2007. However, MAP began collaboration with the University of Alaska Anchorage's Environmental and Nature Resources Institute, and developed a recertification class. EPA has authorized this recertification program, which is now taught to technicians needing recertification. To date, three recertification workshops have been held, one each in Anchorage, Bethel, and Dillingham. Impact Statement: People participating in this training developed 18 EPA-approved Quality Assurance Project Plans for their region, and were thus able to receive funding to employ a local tribal environmental coordinator. Twenty-seven technicians have been recertified by MAP. These efforts established a first line of defense to detect future water quality issues. Participants are now actively engaged in questioning activities that may potentially affect water quality in their communities and regions, and are actively educating others in their communities about water quality issues. The data collected by these monitors provide a baseline for detecting and tracking future water quality changes that may result from human and natural change. *[(wq train)]*

1178 CALIFORNIA: Modeling Coastal Processes

We have identified several general categories of users who will benefit from the results of this research: The modeling capability can be used in a predictive mode by local, state, and federal environmental regulators currently setting standards for non-point storm water runoff and Total Maximum Daily Loads for inland streams that discharge to the ocean and for atmospheric emissions. The research will also benefit the operators of municipal and industrial facilities that discharge into impacted embayments who need to understand the impacts of their respective discharges. The research will assist EPA and other regulatory agencies in evaluation of alternative schemes for remediation of contaminated coastal sediments, such as the DDT patch near Santa Monica Bay, currently the focus of a federal Superfund effort. The research will be useful to marine scientists trying to understand how the physical and biogeochemical processes in enclosed embayments interact with the natural aquatic ecosystem. The research will be useful to marine scientists trying to understand where to site marine protected areas. The research will assist scientists in understanding the causes and characteristics of harmful algal blooms in the coastal region. *[R/CZ-193 (prot wq mod res mon)]*

156 CONNECTICUT: Connecticut Sea Grant Partners Develop CT Aquatic Nuisance Species (ANS) Management Plan

Addressing aquatic plants, freshwater vertebrates and invertebrates, and marine species, the plan implements a coordinated approach to minimizing the ecological, socioeconomic and public health impacts of ANS in the State of Connecticut, and coordinates ongoing and new research, educational, monitoring, and regulatory efforts to focus on commonly-identified priorities, strategies, and tasks. Drafted jointly by CTSG, CT DEP, and the CT Institute of Water Resources, with input from numerous

stakeholders, the plan was signed by the Commissioner of DEP and Governor M. Jodi Rell in March 2007. It subsequently received approval of the federal ANS Task Force in May 2007. Impact: • Connecticut now has a blueprint for management, research, and outreach that outlines priority goals, objectives and actions for a five-year period. As the plan is implemented, CT will benefit from a comprehensive and coordinated approach to address early detection and monitoring, rapid-response, control and eradication, spread prevention, and policy / legislative needs with respect to aquatic nuisance species in a timely manner. Coupled with appropriate research to address local/regional problems and educational programs targeted at a range of audiences to raise awareness of the issue, the result should be more efficient use of available resources to address priority ANS problems in CT, better coordination among involved parties, and a greater awareness of the problems ANS cause locally, nationally, and globally. • CT DEP applied for and was awarded an equal share ($43K) of the federal funds available to support the implementation of state management plans in 2008. A job description for a state invasive species coordinator with CT DEP is complete; a state hiring freeze has delayed the filling of the position. *[(ebm soc wq mon inv)]*

471 CONNECTICUT: Sea Grant / NEMO training and tools used to modify regulations and plans in 20 towns

Sea Grant / NEMO programs for Connecticut coastal community decision-makers on land use impacts on water quality and coastal resources have trained more than 500 land use commissioners on land use planning principles and map and site plan review procedures, resulting in updated Community Plans in 10 towns, revised regulations to include water resource protection in eight towns, and the use of new development practices in five towns. In more than 20 towns, regulations and town plans have been changed to protect water quality. *[A/E-1 (wq train)]*

941 CONNECTICUT: Sea Grant training leads to model for municipal shellfish management

Using GIS training provided by Connecticut Sea Grant and The University of Connecticut Geospatial Technology Program, the Town of Groton (CT) Shellfish Commission completed a project to identify and map all watersheds in the town and the associated salt water estuary receiving runoff from each watershed. The availability of this map and associated data provides the basis for calculating the contaminant load reaching each estuary and the ability to develop a specification for the maximum tolerable load. Commission members are working with Town leaders to make more informed land use decisions that have the potential to impact local shellfisheries and shellfish resources. The project was featured on Public Television and serves as a statewide model for municipal shellfisheries management. *[A/E-1 (mod ebm wq fish)]*

1242 FLORIDA: Improved portable water quality testing device

The portable, handheld device improved through this project and used to test water samples for a variety of problematic bacteria groups offers the potential for more advanced water quality monitoring. *[R/C-E-52 (mon wq)]*

159 GEORGIA: Sea Grant supplies modeling capability to South Korea

In Georgia Sea Grant project R/HAB-25, Dr. Charles Tillburg developed a three-dimensional hydrodynamic model (ECOMSED) to simulate the physical conditions of Gamek Bay (South Korea) and a water quality model (RCA) to determine residence times in the Bay. These modeling have been adopted by the National Fisheries Research and Development Institute (NFRDI) of South Korea. *[R/HAB-24 (mod wq)]*

133 LAKE CHAMPLAIN: Sea Grant engages retailers to reduce residential use of phosphorous fertilizer

Focus Area: HEALTHY COASTAL ECOSYSTEMS NOAA SG Goal - Widespread use of ecosystem-based approaches to managing land, water and living resources in coastal areas LCSG Goal - Ecosystem-based approaches used to promote a healthy and diverse ecosystem and provide for sustainable human use and enjoyment of Lake Champlain, the basin and surrounding waters. Objective - Decision-makers, planners, and managers apply knowledge of basin ecosystem processes to reduce the effects of environmental stressors and long-term human and ecosystem health. Sea Grant engages retailers to reduce residential use of phosphorous fertilizer. In 2003 organizations in Vermont and New York interested in protecting the health of Lake Champlain joined to form the Green Lawn Coalition. Lake Champlain Sea Grant was a founding member. The group education activity has focused on educating retailers to a) increase the availability of no-phosphorous lawn care alternatives and b) to involve them in point of sale education of consumers about no phosphorus fertilizer. An assessment of the education effort showed three important changes. Fertilizer tonnage reports show amounts of non-farm phosphate-containing fertilizer brought into Vermont for sale to consumers nearly halved, dropped by nearly half, from 294.25 tons in 2003 to 161.2 tons in 2007 (2008 data were not available). The number of phosphorous free lawn care products registered for sale in the state increased dramatically. Although registration data only show that a product was intended for sale in the state, such data are a good proxy for consumer demand for a product. There were 80 phosphorous free lawn care products registered in 2003, at the start of the education effort. The number grew to 145 in 2006 and nearly tripled to 221 in 2008. The number of retailers also grew, from less than ten before 2003 to 41 in 2008 - 29 in Vermont and 12 in the New York portion of the basin. *[A/M-1 (ebm res wq wq)]*

134 LAKE CHAMPLAIN: Sea Grant helps towns and school districts eliminate phosphorous fertilizer use

Focus Area: HEALTHY COASTAL ECOSYSTEMS NOAA SG Goal -Widespread use of ecosystem-based approaches to managing land, water and living resources in coastal areas LCSG Goal - Ecosystem-based approaches used to promote a healthy and diverse ecosystem and provide for sustainable human use and enjoyment of Lake Champlain, the basin and surrounding waters. Objective - Decision-makers, planners, and managers apply knowledge of basin ecosystem processes to reduce the effects of environmental stressors and long-term human and ecosystem health. Sea Grant helps towns and school districts eliminate phosphorous fertilizer use. Fertilizer containing phosphate is used by towns and school districts in Chittenden County, VT, as part of routine grounds in care in parks, public areas and school grounds. , Lake Champlain Sea Grant and the VT Agency for Natural Resources teamed to develop an education program in 2008 to inform school district and municipal grounds care supervisors about the impacts of phosphorous use on local and lake water quality, and the environmental and educational benefits of adopting phosphorous free grounds care on these highly visible public properties. By fall 2008, four of the 7 school districts that were using phosphate-containing fertilizer changed to low input,

no phosphorous grounds care practices. Two of the five municipalities that reported using phosphorous-containing fertilizer both began trials in 2008 to evaluate cost, effectiveness and ease of use of phosphorous free fertilizer. *[A/M-1 (ebm wq)]*

144 LAKE CHAMPLAIN: Sea Grant helps secondary school students in Vermont learn about water quality, NPS pollution, and aquatic ecology

Focus Area: HEALTHY COASTAL ECOSYSTEMS NOAA SG Goal- Widespread use of ecosystem-based approaches to managing land, water and living resources in coastal areas LCSG Goal - Ecosystem based approaches used to promote a healthy and diverse ecosystem and provide for sustainable human use and enjoyment of Lake Champlain, the basin and surrounding waters.Restore coastal and aquatic ecosystems in the Lake Champlain basin. Objective. Local residents and communities (including youth) act to protect and restore coastal, aquatic and watershed resources in the basin as a result of increased awareness of threats from NPS pollution (including phosphorus, toxins and bacteria), invasive species, and other water-related human health hazards. Objective. Provide effective education programs for pre-college youth on water quality, water resources and watershed issues important to sustainable use and management of Lake Champlain and basin water resources. Sea Grant helps secondary school students in Vermont learn about water quality, NPS pollution, and aquatic ecology. UVM Watershed Alliance offers lab, field, classroom, and research vessel based watershed and lake education programs to secondary school students in Vermont. During the reporting period, we reached over 1400 students from public, private, urban and rural schools throughout the Lake Champlain Basin. During the fall 2008 program season, approximately 240 7th and 8th grade students at Edmunds middle school in Burlington, the largest urban area in Vermont, participated in WA watershed education programs. We held two classroom sessions on key watershed concepts and one field session to collect water quality data with 160 students, and 80 students received classroom instruction on NPS pollution and urban watersheds. Pre and post testing indicated a 38%, 14%*, and 50% average increase in watershed knowledge for the respective classes. *This number may be lower as a result of an essay question that was included in the post-test, but not the pre-test'"the teacher did not feel the essay would be appropriate for the pre-test. As such, post-test grades may have been adversely impacted. *[A/M-1 (train wq)]*

135 MAINE: Partners clean up Ogunquit beaches

High bacteria levels on Ogunquit Beach prompted the Maine Healthy Beaches Program to conduct a multi-year special study of the Ogunquit River and Ogunquit Beach watershed. In 2008, program staff (in partnership with the Maine Geological Survey) presented the study findings and recommendations based on a coastal current survey, additional monitoring, and GIS HOT-SPOT analysis to state and town representatives and local residents. As a result, the town of Ogunquit inspected 53 subsurface disposal systems, initiated a stormwater mapping project, and the Ogunquit Conservation Commission passed a new ordinance titled: An Ordinance to Amend the Ogunquit Zoning Ordinance (Title X) to Protect Additional Streams Beyond Those Required by Department of Environmental Protection Minimum Shoreland Zoning Guidelines. Additionally, the towns of Wells and Ogunquit committed $8,000 to support implementation of the Ogunquit River Management Plan (in partnership with the Wells National Estuarine Research Reserve). *[A/08-01 (wq wq wq ebm prot)]*

1343 MARYLAND: Research provides new sensor application for real time data acquisition from small boats

Maryland Sea Grant research funding supported development of real time urea sensor system deployed from small boats currently being used in Maryland and by Florida Fish and Wildlife Institute for water quality monitoring and research. *[R/WQ-3 (wq mon)]*

1378 MISSISSIPPI/ALABAMA: Sea Grant assists local waterfront community in planning for the future.

Funding for the Town of Dauphin Island, Alabama was used to develop a long-term strategic and implementation plan that will improve "community development, environmental protection, economic improvement, unified governance, and means for capitalizing on the Island's cultural assets and tourism/recreational resources." Impact: In a short period of time, the Dauphin Island strategic plan has led to major changes in the town's economic growth, cultural tradition and environmental stewardship by increasing nature-based tourism, developing the working waterfront district and replacing impermeable surfaces with environmentally-friendly pervious surfaces to improve drainage and reduce environmental impact of the development. *[R/CCD-10-PD (wq)]*

149 NEW YORK: Sea Grant workshop helps stakeholders understand Lake Ontario lower food web indicators

NYSG compiled information for using lower food web indicators to gauge Lake Ontario ecosystem health and sustainability. At a one-day workshop where top U.S. and Canadian scientists presented this information to the public, 50 attendees learned the effects of nutrient regulation on zooplankton, phytoplankton and fish communities, and how lower food web organisms may indicate ecosystem sustainability. Participants evaluated the workshop highly successful and the Ontario Ministry of Natural Resources (OMNR) requested NYSG develop a companion workshop for Canadian stakeholders in 2009. OMNR also recommended that this workshop template be adapted by the Lake Ontario Committee to present to the NY-Ontario public as part of the revision of Fish Community Objectives for Lake Ontario. NYSG information will be used as the Great Lakes Fisheries Commission develops a 'traffic-light' model to help stakeholders understand the links between ecosystem sustainability and the status of food web indicators. The model assigns a red color to indicators of serious ecosystem stress, yellow to indicators of moderate stress, and green to food web indicators of a healthy ecosystem. *[A/EEP-33 (ebm wq fish train)]*

146 NORTH CAROLINA: Students Receive Hands-On Estuarine Education

In spring 2008 and spring 2009, North Carolina Sea Grant researchers took, in total, 840 eighth graders and their teachers out on the Neuse Estuary aboard our research ship, the RV Humphries. The students received hands-on education about water quality assessment and also were given handouts and other instruction about how land-use changes in the watershed influence estuarine water quality. The feedback from the students and teachers has been highly favorable, and pre-/post-evaluation scores indicate that this educational experience significantly increased students' knowledge about the Neuse

ecosystem and the strong relationship between land use changes and receiving water quality. *[R/UC-1 (edu edu wq ebm)]*

427 OHIO: Sea Grant assists the Ohio travel industry to protect Great Lakes water

Ohio Sea Grant provided input, guidance and training to Ohio's tourism industry and conservation agencies regarding the Great Lakes Compact. At the request of the conservation agencies, Huntley met with 11 key legislators as a technical expert to provide information related to Lake Erie tourism and Great Lakes water. Impact: The Great Lakes Compact was passed in early-summer 2008 thus preventing unauthorized diversions of Great Lakes water. *[(wq train)]*

117 OREGON: Contamination Source Identified by Sea Grant Efforts

Spurred by high beach closures due to contamination, Oregon Sea Grant's Curry County Extension Agent Frank Burris, teamed with state and federal researchers and coast citizens to document the timing and extent of bacterial contamination. His vigilant and frequent sampling reduced the number of beach closure days by 43%. And, more importantly the more than 300 water samples taken over the past three years along five creeks and the ocean identifies the source is terrestrial, not marine. Not only is the bacteria coming from upstream, the 24-hour tests showed that the level of harmful bacteria increased at night. A newly discovered finding as DEQ always takes water samples during the day. Sleuthing the upstream source (sources) is underway Speculation at this point leans towards a combination of septic tank system failures and high water runoff (with domestic animal feces) from city neighborhoods. The many hours spent in early 2007 in waist high surf taking middle-of-the-night water samples is paying off. http://www.currypilot.com/ne/results.cfm?story_no=14484 http://oregonprogress.oregonstate.edu/mediaindex.php#slideshow scroll down to 'Tracking Beach Contamination.' Then click on 'slide show' to view. *[A/ESG-7 (wq wq wq)]*

1479 OREGON: Master Watershed Program Moves Beyond Oregon Borders

Oregon Sea Grant's Master Watershed Steward (MWS) program has been delivered to watershed groups and citizens interested in watershed enhancement for the past seven years. Many impacts have been recorded in relation to people conducting field projects: Teachers apply their watershed steward training in their classrooms where class projects improve their community watersheds; local government, citizen groups, and business leaders apply stewardship training in on-the-ground stream and wetland projects. Several report they have applied for and received grant funding to enhance their projects. Surveys were sent to states who purchased an MWS Learning Guides or requested information on how we organize and deliver our program. Seventeen surveys were completed from ten different states and Mexico; eleven indicated they have used the materials and have delivered some type of watershed related program. Three states have active watershed stewards programs based on Oregon materials and experiences: Arizona, North Carolina and Texas which are multiplying the efforts of success. *[A/ESG-7 (edu edu train ebm wq)]*

107 SOUTH CAROLINA: In-situ acoustic instruments and fluorescence used to determine physical controls on benthic fluxes of microalgae.

Activities for this project began in August of 2008. This investigation is designed to use autonomous, in-situ acoustic instruments along with synchronized, simultaneous measurements of fluorescence to determine the possible physical controls on chlorophyll a (chl a) concentrations in Winyah Bay and North Inlet (SC). The planned data collection periods include seasonal deployments in both systems for comparison. Six minute averaged pressure data recorded during the installation shows a semi diurnal tidal oscillation characteristic of North Inlet and most East coast estuaries. North Inlet with no fresh water input is dominated by oceanic water and water levels are determined primarily by tides. The deployment occurred just prior to the peak in the spring tide and continued through the transition to neap. Harmonic analysis of the velocity components (u, along channel east, and v, cross channel north) derived from the ADVs shows the four major constituents in order to be; M2, K1, M4 and O1. Along channel velocity showed asymmetry toward ebb flow throughout the time of deployment. Maximum ebb flow velocities averaged approximately 42 cm s-1 and varied only slightly with the transition to spring tide. Flood tide velocities into the marsh showed a narrow range of 12 to 15 cm s-1. Asymmetry in channel velocities is an expected feature of the marsh being observed in previous investigations in North Inlet (Voulgaris and Meyers, 2004). Two, unequal daily peaks in chl a are evident over the displayed time series, though the overall magnitude of the peaks diminish with time probably due to biofouling. Peaks in chlorophyll appear to occur at low water only and close to slack water. The larger peaks in chl a concentration occur concurrently with Total PAR peaks (Total PAR data for the deployment period were downloaded from the Baruch Marine lab website, Oyster Landing NERR platform, http://links.baruch.sc.edu/weather.htm), however, the smaller peak occurs in the absence of light. The maximum in chl a concentrations, though influenced by light, appears to correlate more closely with low water and maximum in ebb flow channel velocity. The next goal will be a longer deployment of the observation tripod in the tidal creek covering an entire spring-neap transition. Special attention needsa to be placed in preventing signal deterioation due to biofouling. *[R/CP-16 (mon wq)]*

408 WISCONSIN: Sustainable Ports Workshop Leads to Environmental Assessment of Muskegon, Mich., Port

Wisconsin's water quality specialist co-chairs the Lake Michigan LaMP Forum, a multi-stakeholder group that facilitates implementation of the Lakewide Management Plan. She helped organize and chair a workshop on Sustainable Ports for the Lake Michigan LaMP Forum, held in Milwaukee on March 1-2, 2007. Wisconsin Sea Grant's Gene Clark and Minnesota Sea Grant's Dale Bergeron assisted in identifying speakers and presenting information about environmental impacts from port facilities on Great Lakes urban coasts. The 25 participants included Forum members, the Wisconsin DOT Harbors Assistance Program, the Great Lakes Ports Association Director, their consultant from Purdue University, USACE and managers from the ports of Duluth-Superior, Green Bay, Milwaukee and Chicago. The GLPA Director briefed the group on their â€œGreen Ports Initiativeâ€, a project to assess environmental concerns and pollution prevention practices at U.S. and Canadian ports and to develop a guidance manual for best management practices. Port managers discussed ongoing efforts to address pollution sources and we toured the port of Milwaukee. As a result, the Forum is working with the port of Muskegon to assess and implement an environmental management system that reduces nonpoint source and air pollution. During 2008, several meetings were held with facility managers and local officials, resulting in a Memorandum of Understanding to work together to implement best management practices. *[A/AS-1 (wq train)]*

489 WISCONSIN: Milwaukee Metropolitan Sewage District invests in sand grooming project based on Sea Grant research

Our research has shown that gulls and stormwater contribute large E .coli loads to the sand, and that the E. coli can survive for extended periods of time. Sand grooming may be one management practice that can reduce the E. coli burden by aerating the sand and allowing it to dry out. The Milwaukee Metropolitan Sewage District provided funding for a sand groomer for two years at Bradford Beach, and continued funding is being solicited from the business community through the Greater Milwaukee Committee. *[R/UC-2 (wq)]*

118 ALASKA: Alaska Sea Grant helped protect coastal water quality

Activity Summary: In 2000, MAP began a partnership with the Alaska Native American Fish and Wildlife Society (ANAFWS), with funding from the Environmental Protection Agency (EPA), to conduct a water quality training program in rural Alaska. The goal of the program was to develop water quality monitoring projects that meet the strict scientific rigor of the EPA Quality Assurance Project Plan (QAPP) protocols. MAP developed the curriculum, taught 60 percent of the course content, served as a technical advisor on several QAPPs. ANAFWS funding of this training program ended in 2007. However, MAP began collaboration with the University of Alaska Anchorage's Environmental and Nature Resources Institute, and developed a recertification class. EPA has authorized this recertification program, which is now taught to technicians needing recertification. To date, three recertification workshops have been held, one each in Anchorage, Bethel, and Dillingham. Impact Statement: People participating in this training developed 18 EPA-approved Quality Assurance Project Plans for their region, and were thus able to receive funding to employ a local tribal environmental coordinator. Twenty-seven technicians have been recertified by MAP. These efforts established a first line of defense to detect future water quality issues. Participants are now actively engaged in questioning activities that may potentially affect water quality in their communities and regions, and are actively educating others in their communities about water quality issues. The data collected by these monitors provide a baseline for detecting and tracking future water quality changes that may result from human and natural change. *[(wq train)]*

277 ALASKA: Alaska Sea Grant helped coastal communities control invasive rats

Activity: (Johnson and Education Services) Alaska Sea Grant joined with the Alaska "Stop Rats" coalition to help control rats in Alaska's coastal communities. The coalition is composed of the U.S. Fish and Wildlife Service, Alaska Department of Fish and Game, National Oceanic and Atmospheric Administration, Shipping Safety Partnership, and others. Alaska Sea Grant published the award-winning book, Rat Control for Alaska Waterfront Facilities, authored by Johnson. Impact Statement: The Alaska Sea Grant publication Rat Control for Alaska Waterfront Facilities has been adopted as the in-house training manual by American Pest Control, the largest pest control company in Alaska. Impact Statement: Education Services created a Web site that featured information provided by MAP agent Terry Johnson on rat control, and links to authoritative sites. Alaska Sea Grant published and distributed 480 copies of the award-winning book, Rat Control for Alaska Waterfront Facilities, authored by Johnson, around the state to harbormasters, fish plant operators, and other managers of waterfront facilities. *[(inv train wq)]*

270 CALIFORNIA: The Spread of Aquatic Invasive Species via Boat Hulls: Minimizing the Risk through Knowledge of Fouling Community Dynamics in Harbors

Boat owners, boating and coating businesses, agencies, policy makers, sanctuary and resource managers, academics and environmental organizations will soon need such research-based information to make cost effective decisions and create sustainable policies for controlling AIS among hull fouling organisms while protecting water quality. This is particularly true in California where the most popular fouling and AIS control technology -- use of copper-based antifouling paints – has impaired water quality, and some harbors are now facing regulatory action restricting the use of copper-based bottom

paints. As a result, this information may help facilitate development of effective fouling control measures that are critically needed. Sanctuary and resource managers and the public at large will also benefit from the development of best management practices for boaters that minimize the spread of AIS. *[(inv wq wq)]*

278 CALIFORNIA: Copper pollution and costs to boaters reduced

New regulations require 2,000 San Diego Bay boat owners to cut 76% of copper discharges by 2022. Sea Grant collaborated on research that showed it would cost recreational boat owners in San Diego Bay $20 million to convert non-toxic hull paints over seven years, but only $1 million if the transition was stretched over 15 years. Instead of a short and expensive timetable, boat owners will have a two-year education period, followed by a 15-year conversion period as recommended by Sea Grant research, potentially saving boaters 95% in costs. *[(wq wq educ)]*

1195 CALIFORNIA: Sea Grant Investigates Bi-national, Socio-Economic Factors in Controlling Hull-Borne Invasive

Species and Reducing Antifouling Pollution Research results are anticipated to assist policy makers and boat owners in making sustainable decisions on policies and practices to co-manage invasive and other hull-fouling species and to reduce antifouling pollution, while maintaining California's $16 billion/year boating industry that supports thousands of small businesses employing diverse staff. For example our data will help to identify affordability and geographic availability of supplies and services to prevent transport of invasive species among highly trafficked, boating areas of the California and Baja California coasts. *[A/EA-1 (inv wq)]*

1196 CALIFORNIA: Sea Grant Studies Ecology of Hull-Borne Invasive Species with Respect to Antifouling Practices and Pesticide Resistance

Research results are anticipated to assist policy makers and boat owners in making sustainable decisions on policies and practices to co-manage invasive and other hull-fouling species and to reduce antifouling pollution, while maintaining California's $16 billion/year boating industry that supports thousands of small businesses employing diverse staff. For example our data will help to identify when and how often hull cleaning is required to minimize the spread of invasive species. Actions that improve water quality, while minimizing the spread and impacts of aquatic invasive species, will ultimately benefit the health of ecosystems, including sensitive island habitats of California. *[A/EA-1 (inv wq)]*

1197 CALIFORNIA: Sea Grant Teaches Sustainable, Co-Management of Antifouling Pollution and Hull-Borne Invasive Species

Title: Sea Grant Teaches Sustainable, Co-Management of Antifouling Pollution and Hull-Borne Invasive Species Published technical report, Alternative Antifouling Strategies Sampler, disseminated 12 PSAs to 416 radio stations, and disseminated a total of 3507 diverse publications to U.S. and international

audiences by mail, Internet site downloads, and meetings. 534 stakeholders and policy makers attended 15 public presentations. 2 radio interviews reached a total of 400,000 listeners. Sea Grant's information was included in 3 articles for 45,000 readers of SEA Magazine, 40,000 readers of The Log boating newspaper, and 1,100 readers of NOAA's "Information Exchange for Marine Educators" e-newsletter. 5305 Internet site viewers included 4335 U.S. and 970 international. Meeting and publication evaluations found that 71%-79% of respondents increased their capacity and 31%-34% stated intentions to use Sea Grant recommendations within 2 years for reducing antifouling pollution and for preventing transport of invasive species on boats kept in saltwater. *[A/EA-1 (edu wq inv)]*

219 DELAWARE: DESG Researchers Develop Molecular Monitoring Tools for Oyster Stock Enhancement Efforts

DESG Researchers Develop Molecular Monitoring Tools for Marine Water Quality Testing. Developed and optimized molecular testing protocols for pathogen and fecal indicator bacteria. Worked in collaboration with the state's environmental monitoring agency (DE DNREC) and the SG Citizen's Monitoring Program to compare the new technique vs standard tests for total Enterococcus. The new techniques are more sensitive and more specific. Impact: This tool extends the capability of the Delaware's state monitoring agency for detecting the presence of harmful bacteria. It can be applied in waters beyond Delaware. *[R/BT-1 (mon wq wq)]*

1305 ILLINOIS/INDIANA: Sea Grant expands training and support for unwanted medicine collection programs

Prescription drugs often end up in wastewater treatment plants and can then contaminate waterways. IISG has developed a resource kit and held workshops to help communities starting unwanted medicine take-back programs. As a result of an IISG workshop and the program's resources, in Sangamon County, Illinois, approximately seven 55-gallon drums of household medicines were collected for safe incineration. Kendall County began an ongoing collection program--residents can drop off medicines at the police station any time. IISG is also co-sponsoring a two-county pilot mail back program with the Wisconsin Pharmaceutical Waste Working Group, a coalition of state and local officials, university extension, several companies involved in disposal, Milwaukee sewage specialists and others. This program, which will launch in 2008, is the first-of-its-kind-- individuals can call to request a mail back envelope to send in their unwanted medicines. IISG provided funding that has been used for graphic design, printing, student help, and other supplies that will be used to distribute information about this mail-back program. IISG has played key roles in the planning and ground work of this new program. *[A/ (train wq)]*

1309 ILLINOIS/INDIANA: Sea Grant informs Legacy Act communities

The Great Lakes Legacy Act authorizes $270 million to remove hundreds of tons of contaminated sediment that has built up over the years and left some local waterways severely polluted. A number of communities are benefiting from this federal funding with many more under discussion. Throughout, Illinois-Indiana Sea Grant is on the ground, informing, educating, and supporting these communities as they go through this process. IISG has worked with communities to plan their next steps and consider

how they can make the most of their newly cleaned-up environment. For example, IISG has helped foster community involvement and feedback in the development of an Ecological Restoration Master Plan for the Muskegon Lake and Ruddiman Creek shoreline. *[A/ (res wq edu)]*

495 LAKE CHAMPLAIN: Sea Grant helps businesses reduce phosphorous in stormwater runoff

Statement: Commercial landscapes account for significant proportions of total lawn area in impaired urban/suburban watersheds in the Lake Champlain Basin. Often ignored in NPS pollution reduction efforts, LCSG continues to works with managers of business and institutional properties to promote the adoption of low input/no phosphorous grounds care through one on one educational activities and technical support. Impacts: An August 2007 survey showed property managers participating in the Burlington pilot project (responsible for an estimated reduction in annual phosphorous loads in runoff of between .45 and .91 metric tons/yr.) were continuing low in put practices after 3 years. Training and assistance provided to property managers lowered barriers to adopting or maintaining BMP for sustainable grounds care on over 128 acres (65%) of priority commercial/institutional lawn area in the Stevens and Rugg Brook watersheds in St Albans, VT. Reduced stormwater runoff volume, and reduced erosion and sediment transport were evident after the first season. Monitoring of runoff volumes, suspended sediment and phosphorous will quantify the impacts. *[(mon train wq)]*

566 LAKE CHAMPLAIN: Sea Grant rain garden education and demonstration projects improve water quality in VT urban areas

LCSG's Winooski Rain Garden Project trained city staff and led the city to adopt rain gardens and rain barrels on municipal property throughout the small (1 mi²) , heavily urban former mill town. Impact: Measurements made at stormwater outlets after various levels of rainfall showed a significant reduction in stormwater volume discharging to Morehouse Brook, a stormwater impaired stream. Reductions in volume discharged ranged from over 70% in ½ inch rainfall to nearly 30 % in a 3 inch rainfall. *[A/M-1 (wq train)]*

1315 LOUISIANA: Effects of freshwater inflow on oyster resources

Data from this project are critical to understanding the effects of freshwater diversions, one of the key restoration/coastal management tools identified in the state coastal management plan. As Louisiana proceeds with more diversions, data from this project will guide the location and the management of the freshwater diversion. *[R/GOI-33 (wq res)]*

226 MAINE: Cleaner beaches equals healthier swimming

The Maine Healthy Beaches Program expanded to two new beaches in 2008. Monitors in the program documented improvements in water quality at eight beaches, while the total number of beach advisories decreased in 2008. Program staff attribute the improvements to special studies and sanitary

surveys, marine pumpout and education/outreach efforts, and local actions to address malfunctioning subsurface wastewater disposal systems and improvements to stormwater systems. *[A/08-01 (res wq wq)]*

227 MAINE: York takes action to protect water quality

The town of York's sandy beaches are an integral part of the local economy, yet several beaches periodically experience high bacteria levels, forcing swim advisories. Town officials, working with the Maine Healthy Beaches program, created a new position for a Shoreland Resource Officer. This new position has allowed the town to be proactive by expanding its water quality program beyond the shoreline to include the upstream watersheds. In addition, with help from the U.S. EPA, beach monitors collected and analyzed additional water samples to identify the source of pollution in the Cape Neddick River. When these results were presented to the town by the beach manager and the Shoreland Resource Officer, the York Selectmen unanimously voted to track down and remediate land-based sources of pollution. *[A/08-01 (wq wq mon ebm)]*

1331 MAINE: Sea Grant helps town clean up its water and beaches

Despite unsafe bacteria levels for recreational water users, the state had decided not to manage the Lincolnville Beach area due to lack of staff resources. Based on monitoring by the MET and Maine Healthy Beaches Program, and the success of previous work in cleaning up contamination in area waters, the Town of Lincolnville decided to make Ducktrap Beach a priority recreational asset and a priority for management, and committed to working with MET to identify contamination sources. Town voters approved the plan, and the state gave the 25-acre beach area to the town as a 25-year free lease. *[A/EXT-06 (mon wq res)]*

1341 MARYLAND: Improved incident light algorithms resulted in a modification of the SAV water quality criteria used by management in the Chesapeake Bay

Research funding supported development of an optical water quality model to predict the diffuse attenuation coefficient for PAR based on commonly monitored water quality variables in the Chesapeake Bay. The results of this research were incorporated into the web version of the diagnostic tool for setting water quality targets for restoration of SAV used by managers in state and federal agencies throughout the Chesapeake Bay region. *[R/P-53 (wq res mod mon)]*

266 MICHIGAN: Sea Grant Helps State Quantify Economic Value of Restoration

Michigan's Office of the Great Lakes asked Sea Grant to estimate the economic benefits to Michigan of implementing the Great Lakes Regional Collaboration Strategy to restore the Great Lakes. The Strategy now forms the basis for a $475M annual appropriation for a Great Lakes Restoration Initiative introduced in the President's 2010 budget. Sea Grant's analysis was used to support a comprehensive restoration plan for Michigan's Great Lakes coasts which has been distributed to Congressional representatives and state legislators (The Michigan-Great Lakes Plan: Our Path to Protect, Restore, and

Sustain Michigan's Natural Treasures). Sea Grant investigators modified a previous analysis done for a Brookings Institution report (Healthy Waters, Strong Economy: The Benefits of Restoring the Great Lakes Ecosystem) and estimated that restoring the Great Lakes could produce $7-13 billion in benefits to the state of Michigan. The report describes how restoration will benefit tourism and outdoor recreation, reduce water treatment costs, and help attract and retain businesses and workers in Michigan. *[(soc res wq)]*

267 MICHIGAN: Helping Communities Effectively Reduce Stormwater Runoff

A Sea Grant-supported research team has developed tools that allow coastal communities to compare runoff-reduction strategies and to identify the places where new stormwater structures can have the most impact. In collaboration with municipal officials from Spring Lake watershed, researchers have developed a model of how suspended solids, phosphorus, and nitrogen move through the watershed. Using these models, they have evaluated the effectiveness and the cost of a wide range of stormwater management options, including vegetated buffers, rain gardens, and porous pavement. In addition, the investigators prepared a comparison of ordinances that municipalities could adopt to reduce runoff from developed areas. *[(mod ebm wq wq wq res)]*

497 MICHIGAN: Clean, Green Marinas Reduce Water Pollution

MI Sea Grant is part of an industry, state government, university partnership that developed and implemented the Michigan Clean Marina program. Sea Grant staff developed the program website, conducted certification workshops, and collaborated on training materials including development of a suite of best practices to help marinas reduce their environmental footprint. To date, 65 marina facilities are voluntarily participating in the Michigan Clean Marina Program. Of these marinas, 21 facilities have achieved Clean Marina certification with an additional 44 pledging to become a certified Clean Marina. *[(wq)]*

498 MICHIGAN: Recycling Plastic, Supporting Michigan Businesses

Marinas, recycling businesses and solid waste facilities are now collaborating to divert thousands of pounds of recyclable plastic shrink-wrap from area landfills, as a result of Sea Grant outreach leaders and partners actively promoting the program. Shrink-wrap, a recyclable plastic material, is used by manufacturers to make recycled plastic products. MI Sea Grant developed the outreach materials and templates for others to customize for educational efforts in Michigan communities, leveraging work from a pilot program in 2007. *[(wq)]*

499 MICHIGAN: Michigan Clean Marinas Reduce Water Pollution, Recycle Shrink-wrap

The Michigan Clean Marina program, a collaborative program led by Michigan Sea Grant, Michigan Department of Natural Resources, and Michigan Boating Industries Association since 2002, encourages marinas to reduce non-point source pollution by voluntarily adopting best management practices. Sea

Grant assisted in conducting clean marina workshops, sharing program materials with neighboring states, and implementing a pilot boat shrink-wrap recycling program. In 2007, this unique partnership involving business, government and academia, also established a foundation to secure continued funding for this successful program. Seventeen Michigan marinas around the state have achieved clean marina status, reducing overall environmental impact on the Great Lakes and connecting waterways. In addition, marinas in southeast Michigan piloted a plastic shrink-wrap recycling program, diverting an estimated 150,000 pounds of reusable plastic from area landfills. *[(wq)]*

1365 MICHIGAN: Marinas help divert shrink-wrap from landfills

A pilot shrink-wrap recycling program in Southeast Michigan resulted in the diversion of approximately 150,000 pounds of boat shrink-wrap from landfills to be used for recycled plastic products. *[C/A/C-1 (wq)]*

1366 MICHIGAN: Michigan Clean Marinas' Plastic Shrink Wrap Is Being Recycled Instead of Landfilled

Several of southeastern Michigan's Clean Marinas are using Best Management Practices and helping improve the quality of the state's waterways by recycling 150,000 pounds of plastic shrink wrap waste instead of sending it to landfills. *[A/FP-1 (wq)]*

124 MINNESOTA: Sea Grant Redefines How E. coli Bacteria is Used in Water Quality Monitoring

Sea Grant scientists discovered that E. coli, which is used to justify beach closures and impaired stream designations, doesn't always come from potentially harmful sources. E. coli can be carried by benthic fish and can reside in sand, sediment, soils, and algae. The discovery nullifies assumptions that E. coli is washed into the water from the land or comes from sewage overflows. Sea Grant researchers also developed new protocols (rep-PCR DNA fingerprinting) for rapidly testing for bacteria and identified sources for most E. coli bacteria in samples from northeastern Minnesota. Samples from gulls, terns, deer, and beaver contributed to a total of 234 new isolates in the region's E. coli fingerprint library. Humans contributed between 0 and 9 percent of the total E. coli that could be identified in each sample. By contrast, E. coli from waterfowl and wildlife accounted for 56-97 percent. Results are being used by the Minnesota Pollution Control Agency (MPCA) to refine testing methods and health risk assessments. Citizens tested bacteria monitoring kits and found that the Petrifilm test kit works best for E. coli monitoring. Volunteers collected nearly 600 bacteria samples from 86 different sites on 40 streams and 14 lakes in 23 Minnesota counties. The sites they monitored were established in the EPA STORET database and data from the 4-year project was submitted to the Minnesota Pollution Control Agency for use in lake and stream assessments. Data are often used by local governments or citizen groups for targeting additional monitoring, identifying areas for best management practices, or securing and allocating funds to conduct further monitoring. Several streams were listed as impaired on the MPCA impaired waters list as a result of volunteers' monitoring. *[(wq wq)]*

321 MISSISSIPPI/ALABAMA: Legal Research on Proposed Hawaiian Bounty Program

The Hawaii Department of Business, Economic Development, and Tourism sought information about the contract and liability issues surrounding the development of a reward program for recovery of derelict fishing gear. The Law Center concluded that the liability concerns were misplaced as the state should be immune from most suits and the reward program would not result in contractual relationships. According to the requesting individual, our research 'helped dispel what seemed to have been '˜an urban myth.' This myth was a roadblock to implementing a major marine debris retrieval program.'? The agency expects to receive funding in 2008 to finally implement the reward program. *[A/L-4 (wq leg)]*

228 NEW HAMPSHIRE: Sea Grant draws attention to a major source of PAHs in the environment

Sea Grant-supported researchers at the University of New Hampshire have proven that fresh pavement sealcoat, particularly coal-tar based sealcoat, contributes significant amounts of polyaromatic hydrocarbons into waterways via stormwater runoff. Impact: Both the EPA and the sealcoat industry are using these findings in an effort to mitigate the problem. *[R/CE-138 (wq wq wq)]*

1395 NEW HAMPSHIRE: Sea Grant takes a holistic approach to reducing marine debris

UNH teamed with the Blue Ocean Society in an effort to remove derelict commercial fishing gear from the Gulf of Maine. Funded by NOAA, the Marine Debris to Energy program produces energy via a waste-to-energy plant. Debris sources and distribution patterns in the Gulf are recorded using underwater sonar. Fishermen, beach cleanup crews and the general public report the location, including latitude, longitude and water depth, where they found the debris. Once the information is entered into a database, it is available on GIS maps for online access at www.nhmarinedebris.org. Impact: NHSG has helped create a model program that could easily be replicated in other regions. *[A/P-42 (wq)]*

229 NEW JERSEY: NJ Sea Grant efforts in NJ Clean Vessel Act Program reduces sewage discharge

The impacts of sewage discharge from recreational and commercial vessels contribute to the degradation of coastal water quality, especially in areas with reduced tidal flushing capacity and high concentration of boats. Since 1995, The New Jersey Clean Vessel Act Program has provided marina owners in New Jersey with an opportunity to apply for funds to install vessel pump-outs at their facilities that collect and dispose of vessel-generated sewage. With management by the New Jersey Sea Grant Extension Program there are now 177 pump-outs and five (5) pump-out vessels that serve boaters that reside in and transit through the state as compared to 50 pumpout facilities in 1995. Over the past several years approximately 600,000 gallons of sewage were collected annually at marina and pumpout boat facilities. *[A/SGEP-1 - A/S-1 (wq wq wq)]*

230 NEW JERSEY: NJ Sea Grant Improves Recycling in the Recreational Boating Industry

Hundreds of tons of shrink wrap are used every year in New Jersey to protect boats during the harsh winter season. To reduce the amount of shrink wrap that ends up in landfills, the New Jersey Sea Grant

Extension Program and the New Jersey Department of Environmental Protection (NJDEP) Coastal Management Office partnered to increase the number of shrink wrap recycling locations, and to launch an education and outreach effort to promote recycling shrink wrap and other materials used to store and maintain boats. The number of disposal options/locations has increased by 20 for a total of 29. According to marine supply businesses, marinas and other boating businesses in New Jersey, approximately 450,000 pounds of shrink wrap is purchased annually and approximately 300,000 pounds or 66% was recycled was recycled in 2006 with an additional 7% increase to 330,000 pounds recycled in 2007. As a result of the education and outreach effort approximately three recycling businesses have been able to expand their client base. *[A/SGEP-1 - A/S-1 (wq train)]*

231 NEW JERSEY: Sea Grant Helps Prevent Sewage Discharges (2008)

(2008) The New Jersey Sea Grant Extension Program has continued its partnership with federal, state and local agencies to reduce sewage discharges from recreational and commercial vessels. The federal Clean Vessel Act and New Jersey Fish and Wildlife have provided funding for 165 pump-outs facilities at marinas and five (5) pump-out vessels to meet the sewage disposal needs of boaters. During the 2008 boating season approximately 600,000 gallons of sewage were collected at marina and pumpout boat facilities. *[A/SGEP-1 - A/S-1 (wq wq wq)]*

232 NEW JERSEY: Sea Grant Develops Education to Improve Recycling in the Recreational Boating Industry (2008)

(2008) New Jersey Sea Grant Extension Program and the New Jersey Department of Environmental Protection (NJDEP) Coastal Management Office partnered to increase the number of shrink wrap recycling locations and, launch an education and outreach effort to promote recycling shrink wrap and other materials used to store and maintain boats. This initiative was made possible by a grant from the I BOAT NJ Program. As a direct result of this effort the number of shrink wrap disposal options has been increased from six to twenty nine and the amount recycled has increased from approximately 36% to 75% *[A/SGEP-1 - A/S-1 (wq train)]*

572 NEW JERSEY: NJ Sea Grant efforts in NJ Clean Marina Program promotes state legislation

The New Jersey Sea Grant Extension Program continued its partnership with the New Jersey Department of Environmental Protection Office of Coastal Management to conduct the New Jersey Clean Marina Program. The Clean Marina Program seeks to assist marinas in complying with regulations by implementation of best management practices. Thirteen (13) marinas are recognized as â€œClean Marinasâ€ with approximately 25 more marinas in the process. Recent proposed legislation by the New Jersey Senate (S2881) provides credit under corporation business tax and gross income tax for marinas and boatyards that follow certain environmentally sound management practices. *[A/SGEP-1 - A/S-1 (wq)]*

573 NEW JERSEY: Sea Grant Helps Marinas Meet Requirements of the Clean Marina Program (2008)

(2008) The New Jersey Sea Grant Extension Program continued its partnership with the New Jersey Department of Environmental Protection Office of Coastal Management to implement the New Jersey Clean Marina Program to minimize the impact recreational boating activities have on the environment. Over 120 marinas have participated in Clean Marina related workshop, 200 marinas have received the guidebook and 27 marinas have been recognized as a Clean Marina. Marinas have implemented best management practices to reduce spills that occur during fueling, capture water from hull washing, rent dustless sanders, improve recycling efforts, collect mercury containing devices, develop emergency response plans, educate boaters and installed pumpout facilities. *[A/SGEP-1 - A/S-1 (wq)]*

123 NEW YORK: New Approaches for Assessing Mutagenic Risk of Contaminants in the Long Island Sound Environment

R/CTP-30 Sea Grant researchers have adapted a cutting-edge biomedical technique to test for the mutagenic potential of coastal sediments. The benthic sediments in urban habitats represent a reservoir of persistent contaminants that may pose a threat to both ecosystem and human health. To help evaluate these risks, testing approaches are needed that assess both acute mortality and potential chronic effects that may reduce the fitness of affected populations. Using a strain of fish embryos carrying a specific gene developed for biomedical research (the Japanese medaka, Oryzias latipes, carrying a lambda cII transgene), researchers tested for the mutagenicity of a large number of sediment samples collected around metro New York and Long Island Sound (LIS). This was a novel use of a biomedical research tool to directly evaluate the mutagenicity of mixtures of contaminants in sediment samples. Results of the project provided baseline information on cytotoxicity and mutagenicity of a relatively large number sediment samples collected around LIS. This approach allows whole sediments to be assessed directly without chemical modification. Through direct contact with the sediment, the embryo accumulates only the bioavailable fraction of contaminants associated with the sediments. Thus, this method allows both environmentally and physiologically realistic exposure scenarios. Based on this work, the lead researcher was awarded a major grant from the National Fish and Wildlife Foundation (NFWF) to study the combined effects of endocrine mimics and hypoxia on aquatic organisms using fish embryos to meet the objectives of the Dissolve Oxygen Benefit Fund. The aim of the NFWF project is to use molecular tools to develop a relatively rapid and inexpensive assay to discern the separate and combined effects of hypoxia and endocrine mimics in urban estuarine systems. New methods and rapid assays will lead to better management practices to mitigate effects of sewage loadings. *[(wq wq wq)]*

265 NEW YORK: Sea Grant researchers adapt a cutting-edge biomedical technique to test for the mutagenic potential of coastal sediments

R/CTP-30 New Approaches for Assessing Mutagenic Risk of Contaminants in the Long Island Sound Environment. Sediments in urban coastal waterways may harbor persistent contaminants that pose a threat to both ecosystem and human health. Using a strain of fish embryos carrying a specific gene developed for biomedical research, researchers tested for the mutagenicity of a large number of sediment samples collected around Long Island Sound. IMPACT: Based on this work, a researcher applied the approach to evaluate the mutagenic potential of sediments from the Rhone River in

Germany. This work brought the researchers a major grant from the National Fish and Wildlife Foundation to study the combined effects of endocrine mimics and hypoxia and to develop a relatively rapid and inexpensive assay to study effects of hypoxia and endocrine mimics in urban estuaries. This new method will lead to BMPs to mitigate effects of sewage loadings. *[(wq wq wq)]*

126 NORTH CAROLINA:

A Sea Grant sediment-sampling protocol for fecal indicator bacteria has identified areas of contamination in local waters used by the public. The sediment sampling approach improves upon conventional water sampling because the indicators last longer in sediments than the water-column signals are available. The researchers provided results to the N.C. Environmental Management Commission, which reviewed the strong influence of stormwater runoff on sediment contamination by fecal indicator bacteria. The research results -- reflected in new, stronger storm water regulations – generated strong reaction and media coverage, thus increasing public awareness of the problems. (NCSG: Effects of Sediment Phosphorus Concentration on Fecal Pathogen Indicators in Estuarine Sediments; R/MER-50) *[(wq wq wq)]*

528 NORTH CAROLINA: Rocky Branch project continues

Through stream and estuarine restoration projects, more than 400 school children, college students and working professionals have be exposed state-of-the-art restoration practices focused on restoring urban streams. In addition, 1000 feet of Rocky Branch were restored using natural channel design, 15,000 square feet of accessible floodplain area was created and 235 feet of creek was daylighted. Five stormwater outfalls were equipped with boulder step dissipating structures, 2000 feet of greenway trail developed, including 220 feet of boardwalk suspended above the newly created floodplain and two new bridges across the creek. Habitat for fish and macroinvertebrates was enhanced and streambank erosion and subsequent downstream sediment loading was reduced. Food and cover for urban wildlife was improved by introducing native fruit and nut producing vegetation and shrub vegetation. *[A/EA-10 (wq res train)]*

258 OHIO: Sea Grant helps local group in $50 million clean up of Ashtabula Harbor

Statement : Ohio Sea Grant was one of the founding entities of the Ashtabula River Partnership (ARP) in 1994. Sea grant has assisted the ARP in its efforts to develop, design and fund a massive cleanup of the Ashtabula River, an International Joint Commission designated Area of Concern on the Great Lakes, in order to remove and keep over 11,000 kilograms of toxic PCB's from entering the open waters of Lake Erie. Impact: The $75.2 million environmental dredging of the Ashtabula Harbor started in 2006 is complete. More than 635,000 cubic yards of PCB contaminated sediment from the Ashtabula River in now in a specially designed landfill thus protecting thousands of acres of Lake Erie from pollution by PCB's. *[(res wq wq)]*

492 OHIO: Sea Grant helps Lake Erie marinas recycle and save money

A boat shrink-wrap recycling program was initiated by Ohio Sea Grant's Clean Marinas Program in 2006, with over 50 tons recycled from 60 marinas. In 2007, 101 marinas participated, with over 100 tons of shrink-wrap recycled from 101 participating Ohio Lake Erie coastal marinas. A post-program survey revealed marinas saved an average of $700 each by recycling instead of paying additional landfill and waste hauling fees. *[(wq)]*

493 OHIO: Sea Grant reduces marine pollution

The Ohio Clean Marinas Program (OCMP) certifies marinas as an 'Ohio Clean Marina' provided they comply with all legal requirements set forth by state regulatory agencies, in addition to numerous Best Management Practices identified in the OCMP manual. During the past three years, owner and managers from 85 marinas have attended OCMP certification workshops. Currently, 39 Lake Erie coastal marinas have earned OCMP certification, with another 20 marinas currently pledged to become Clean Marinas. *[(wq)]*

549 OHIO: Sea Grant reduces marine pollution

Hazardous chemicals and polluted stormwater runoff are common to many marina operations but Ohio Sea Grant's Clean Marinas Program certifies marinas that have implemented EPA approved pollution control practices. Impact: In the last year, managers from 17 marinas have attended Ohio Clean Marinas workshops, 4 marinas have been awarded certification, and another 7 marinas have taken the pledge to become Clean Marinas. *[(wq)]*

117 OREGON: Contamination Source Identified by Sea Grant Efforts

Spurred by high beach closures due to contamination, Oregon Sea Grant's Curry County Extension Agent Frank Burris, teamed with state and federal researchers and coast citizens to document the timing and extent of bacterial contamination. His vigilant and frequent sampling reduced the number of beach closure days by 43%. And, more importantly the more than 300 water samples taken over the past three years along five creeks and the ocean identifies the source is terrestrial, not marine. Not only is the bacteria coming from upstream, the 24-hour tests showed that the level of harmful bacteria increased at night. A newly discovered finding as DEQ always takes water samples during the day. Sleuthing the upstream source (sources) is underway Speculation at this point leans towards a combination of septic tank system failures and high water runoff (with domestic animal feces) from city neighborhoods. The many hours spent in early 2007 in waist high surf taking middle-of-the-night water samples is paying off. http://www.currypilot.com/ne/results.cfm?story_no=14484 http://oregonprogress.oregonstate.edu/mediaindex.php#slideshow scroll down to 'Tracking Beach Contamination.' Then click on 'slide show' to view. *[A/ESG-7 (wq wq wq)]*

234 PENNSYLVANIA: Preventing Boater Pollution

Started a collaborative boat shrink-wrap recycling program in the Erie area in an effort to keep shrink-wrap out of waterways and landfills. The seven participating marinas collected 25,000 pounds of boat shrink-wrap. The shrink-wrap coming off of a boat can weight anywhere from 35-50 pounds depending on the boat size. Mondo Polymer Technologies, Inc. from Reno, Ohio recycled the shrink-wrap into 3,500 environmentally safe guardrail blocks for highway guardrail systems across the nation. *[(wq)]*

235 PENNSYLVANIA: Erosion and Sedimentation Control

Engineers installed BMPs to control stormwater runoff and associated erosion on the Penn State Behrend campus. These upgrades will prevent an estimated 78 tons of sediment from entering Fourmile Creek each year. *[(wq wq)]*

236 PENNSYLVANIA: Raising Awareness of Pharmaceutical Waste in Pennsylvania's Waterways

Collaborated with Lake Erie-Allegheny Earth Force, Erie Times News in Education, LECOM School of Pharmacy, and the City of Erie to hold a pharmaceutical collection event and provide education and outreach efforts to the residents of Erie on the safe and proper disposal of unwanted or expired pharmaceuticals. The collection event brought in 87 participants and collected 600 pounds of unwanted medications and personal care products. The media campaign reached thousands of Erie citizens via newspaper articles, newscasts, surveys, posters and postcards, and presentations. *[(wq wq wq)]*

1486 PENNSYLVANIA: Preventing Boater Pollution

Distributed approximately 3,500 bilge socks and associated outreach materials to boaters across Pennsylvania as a pollution prevention measure. Each bilge sock can absorb 1.5 quarts of oil; the project has the potential to prevent 5,250 quarts of oil from entering Pennsylvania’s waterways. *[A/ (wq edu)]*

319 SOUTH CAROLINA: Instrumentation deployed to understand sediment flow patterns as they relate to beach renourishment.

Preliminary data analysis has shown that sediment suspension and transport occurs frequently on the hard bottom reefs on the shore face and inner-self region during small to moderate meteorological events (winds greater than approximately 10 m/s). In addition, sediment thickness on the hard bottom reefs has been shown to be variable on time scales such as days to months. All instrumentation was deployed July 1st, 2009, and has been collecting continuous times series data over four 6-8 week deployments. The instrumentation is currently deployed at the site and continuous deployments will continue throughout the year 2009. Additional data analysis efforts are being undertaken to address (1) constraining the environmental forcing resulting in along-shelf vs. across-shelf transport of sediment (2) determining the frequency and magnitude of these transport components and (3) relating the temporal variability of sediment transport measured in between geophysical surveys to the observed spatial changes. *[R/CH-1 (mon wq mon)]*

237 TEXAS: Texas Sea Grant supports private partnerships in and sponsorships of environmental protection programs (2008)

After completing its transition to an industry-managed model as prompted by Texas Sea Grant's marine business specialist, the Clean Texas Marina Program is much less dependent on ongoing federal and state funding and is expected to have less difficulty attracting marina participation now that a regulatory agency is not a principal in the program, thus increasing the number of marinas and boaters in Texas who adhere to best environmental practices. During the reporting period, five additional marinas became certified under the program, three marinas were recertified and three new marinas pledged to participate; more than half of these were after the change to the industry-managed model. *[A/F-1 (train wq)]*

238 TEXAS: Texas Sea Grant promotes public participation in environmental protection programs (2008)

As an adjunct to the Clean Texas Marina Program and also administered by the Texas Sea Grant marine business specialist, the Clean Texas Boater Program continued to promote environmentally sound practices to individual boaters in Texas. The program solicited an additional 1,000 recreational boaters pledging to support clean water in Texas during the reporting period, bringing the total membership up to 3,500. The program has been adopted by several clean marina programs in the country, including Maryland, Virginia and Mississippi/Alabama potentially expanding knowledge of and participation in clean boating practicing exponentially. *[A/F-1 (train wq)]*

240 TEXAS: Texas Sea Grant leads effort to remove monofilament line from the environment (2008)

Volunteers in the ongoing Monofilament Recovery and Recycling program continued to collect monofilament fishing line from recycling bins and send it in to be recycled. The program strives to increase public awareness of the impact to wildlife and property by improper disposal of monofilament fishing line into the environment. A total of 118 pounds of monofilament line was collected and sent to be recycled during the reporting period. *[A/F-1 (wq train)]*

242 TEXAS: Prairie wetland restored at Sheldon Lake State Park (2008)

The Texas Sea Grant Wetland Restoration Team completed the very successful prairie wetland complex restoration at Sheldon Lake State Park, where about 8 acres of former agricultural lands were restored using new aerial photography methodology. The team planted between 5,000 and 7,500 plants, which have since flourished and now completely dominate the entire 8 acres. This project will have a direct impact on improving runoff water quality in the upper Galveston Bay and will provide habitat for waterfowl in the area. The project will have significant impact through the entire region because it has demonstrated how historical aerial photographs can be used to enhance the chances for restoration success. *[A/F-12 (res train wq)]*

244 TEXAS: Work and monitoring was continued on Brays Bayou stormwater treatment wetland project (2008)

Wetland Restoration Team efforts continued on the award-winning Brays Bayou stormwater treatment wetland project. This wetland project has received much local attention after winning a Gulf Guardian Award for partnership in December 2006 and being featured on local news programs. The Wetland Restoration Team continued to collect water quality monitoring data (temperature, water clarity, conductivity, dissolved oxygen levels, E. coli presence and quantity) to evaluate the success of the wetland. Preliminary data suggest near complete treatment of stormwater runoff for bacteria, the contaminant of most interest in the Houston area. Funding was received to improve the monitoring effort. The project involved 12 different partners, of which the Texas Coastal Watershed Program (TCWP) was the coordinator for the partnership. This project brought new ideas and perceptions of stormwater wetland systems to the region. *[A/F-12 (wq)]*

246 TEXAS: Texas Sea Grant monitors wetland project at Brays Bayou for stormwater treatment (2009)

2009 - Wetland Restoration Team efforts continued on the award-winning Brays Bayou stormwater treatment wetland project. This wetland project has received much local attention after winning a Gulf Guardian Award for partnership in 2006 and being featured on local news programs regularly since its completion. The Wetland Restoration Team continued to collect monthly water quality monitoring data (temperature, water clarity, conductivity, dissolved oxygen levels, E. coli presence and quantity) to evaluate the success of the wetland. Collected data suggests this wetland system successfully treats bacteria and other pollutants from runoff. *[A/F-12 (res mon wq)]*

247 TEXAS: Texas Sea Grant promotes public participation in environmental protection programs (2009)

As an adjunct to the Clean Texas Marina Program and also administered by the Texas Sea Grant marine business specialist, the Clean Texas Boater Program continued to promote environmentally sound practices to individual boaters in Texas. The program solicited an additional 1,000 recreational boaters pledging to support clean water in Texas during the reporting period, bringing the total membership up to 3,500. The program has been adopted by several other clean marina programs in the country, including Maryland, Virginia and Mississippi/Alabama. *[A/F-1 (train wq)]*

249 TEXAS: Texas Sea Grant removes monofilament line from the environment (2009)

Volunteers in the ongoing Monofilament Recovery and Recycling program continued to collect monofilament fishing line from recycling bins and send it in to be recycled. The program strives to increase public awareness of the impact to wildlife and property by improper disposal of monofilament fishing line into the environment. A total of 141.9 pounds of monofilament line was collected and sent to be recycled during the reporting period '" an increase of 20 percent over 2007. Estimating line strength at 12 pound test (common for coastal Texas), this 141.9 pounds corresponds to a distance between 225.7 and 378.9 miles (roughly the distance between Houston and New Orleans). This brings the total pounds reported collected to 440.9 pounds since 2004 (the first year of records). *[A/F-1 (train wq)]*

1589 WASHINGTON: Sea Grant Develops Tools to Determine Sources of Shellfish Contamination

Shellfish growing areas in Puget Sound are classified as suitable for harvest based on sanitary surveys and fecal coliform monitoring. Sea Grant researchers developed a novel F+ RNA coliphage genotyping assay to differentiate between human and animal sources of fecal contamination. Impact: Newly developed fecal coliform indicators assisted the WA Department of Ecology, the Squaxin Tribe, and local shellfish growers to identify sources of shellfish contamination and develop appropriate management strategies for shellfish growing areas. *[R/A-84 (Prog Dev) (mon wq)]*

1592 WASHINGTON: Sea Grant doubles Clean Marina participation

There currently are more than 200 marinas in the state that would be eligible to participate in Clean Marina Washington. The long-term goal is to enlist all of them in this incentive-based certification program in which marinas assess their operations and implement environmental safeguards. Participants agree to use best management practices including approved fueling procedures, stormwater run-off treatment, and toxic controls to protect marine water quality. Partnering with Puget Soundkeepers, state agencies and local boating organizations, Sea Grant provides marina certification inspections throughout Puget Sound and coastal Washington. Impact: In 2007, 18 new certifications were approved for public and private marinas, doubling participation in Clean Marina Washington. *[A/FP-7 (wq)]*

1602 WASHINGTON: Sea Grant leads efforts to enhance environmental benefits of Puget Sound commercial and recreational shellfish harvests

In south Puget Sound, Washington's top molluscan shellfish production area, Sea Grant recruited and trained volunteers to remove debris, reclaim acres of tidelands and improve availability of clams and oysters for public harvest. Tribal, state agency and shellfish industry partners joined with Sea Grant and dozens of community volunteers in workshops, field trips and enhancement activities to provide additional public shellfish resources and increase shellfish filtration of the Sound. Impact: Fifteen acres of shellfish beds have been restored and are now more accessible to the public and tribal harvesters. The shellfish industry and shoreline homeowners are better educated to deal with water quality issues, and some have decided to upgrade their septic systems. *[A/FP-7 (train res wq edu)]*

1607 WASHINGTON: Sea Grant Offers Homeowners Simple Techniques to Reduce Nutrient Loading into Hood Canal

Hood Canal is experiencing low dissolved oxygen levels partly due to excess nitrogen in the ecosystem, resulting in fish kills and other changes to the local ecology. Sea Grant is training homeowners to install simple kitchen sink screens that trap food waste and reduce introduction of nitrogen into septic systems that drain into Hood Canal. Impact: Over 2,000 homeowners now use these devices, preventing an estimated 1.5 tons of nitrogen from being introduced into Hood Canal. *[A/FP-7 (train wq)]*

1646 WASHINGTON: Sea Grant works to expand Clean Marina Program

A founding member of Washington's Clean Marina Partnership, Sea Grant provides marina certification inspections throughout the Puget Sound and coastal regions. Participating public and private marinas employ best management practices for fueling procedures, stormwater treatment, toxic control and other activities, contributing to the cleanup of local water bodies. Impact: More than 40 Washington marinas have been certified since the inception of the program, with 18 new Clean Marina certifications approved in 2008. *[A/FP-7 (wq)]*

250 WISCONSIN: Sea Grant Helps Entrepeneurs Address Dreissenid Mussel Nuisance on Beaches

Wisconsin Sea Grant's water quality specialist was contacted by two individuals who invented a portable machine for vacuuming up mussel shells from beaches and grinding them into sand. She helped organize a meeting (June 6, 2008) with state Department of Natural Resources staff to address potential environmental concerns and state permit requirements. As a result of the meeting, WDNR encouraged the Beachmakers Co. to conduct field tests on state-operated beaches during summer 2008 and is considering drafting a general permit to allow transformation of shells to sand and redeposition on beaches without lengthy and expensive individual permits ($500 and several months time). *[A/AS-1 (wq inv)]*

488 WISCONSIN: Sea Grant partners with Miller Brewing Company to improve Bradford Beach

Our lab, together with Miller Brewing Company and the Milwaukee Metropolitan Sewage District, collaborated with Milwaukee County Parks in their application for a Blue Wave Award, which is given to beaches meeting certain quality criteria. Our research contributes to both monitoring and remediation aspects of this goal. Miller Brewing Company is investing $500,000 into improving Bradford beach, $100,000 of which is directed to the GLWI to fund additional monitoring of the sand, buoys, a web cam, and signage. *[R/UC-2 (wq mon)]*